# here's ONE way of replacing gas service lines that rust

## ...with Copper Tubes that won't

FOR more than ten years, a gas utility in a large midwestern city has followed a program of service line replacement by feeding copper tubes through the rusted-out service. During 1948, a total of 8,978 such service renewals was made.

Acceptable? You bet! Not only to management because of its dependability and obvious economy . . . but also to the public because of speedy repairs and the elimination of practically all trenching.

Note the simplicity of the method illustrated here. Wouldn't this, or a similar method, be applicable in your territory too? Our Technical Department has had a great deal of experience with the uses and applications of copper tubes and is willing to share it with you. Just send your inquiry to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

4923

**1**

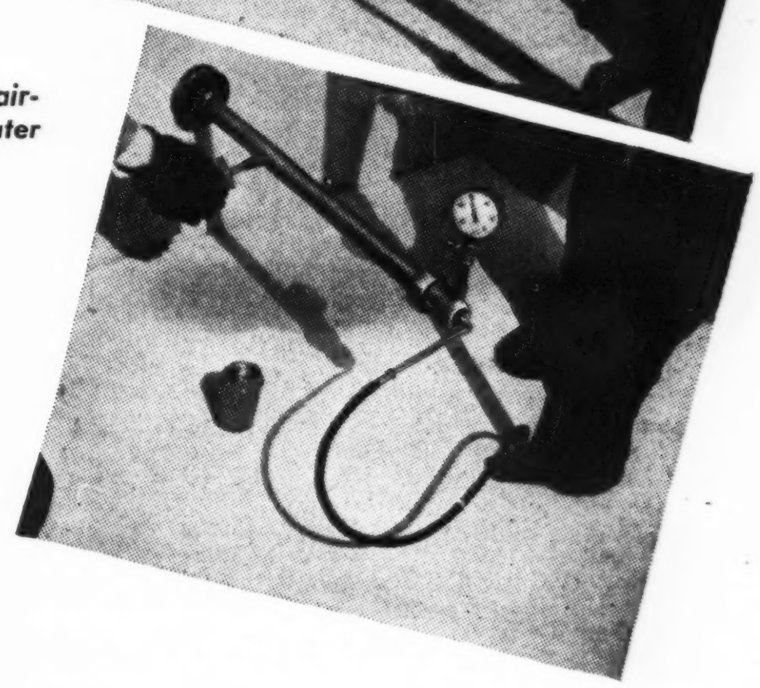
*When replacing a service, a small opening is made over the main, and the old 1½" steel pipe is cut off about 6" from the main tap.*

**2**

*In the basement, 1¼" hard drawn copper tube is fed into the old service. Sometimes a reaming operation precedes it. The rubber stopper keeps out dirt and provides a seal for testing.*

**3**

*Successive lengths of tube are joined by soldering a tinned copper sleeve inside the tubes.*

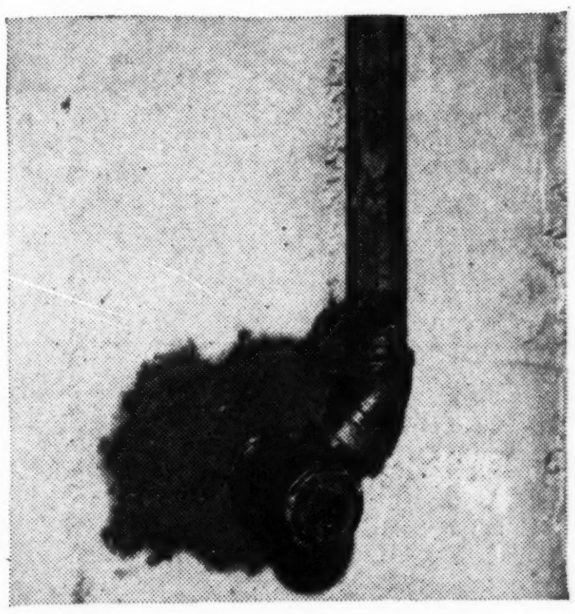


**4**

*Soldered connections are air-tested with a soapy water solution.*

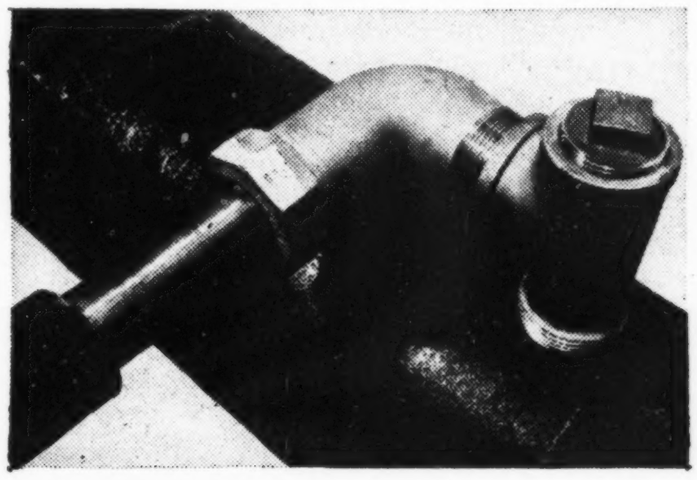
**5**

*Completed basement connection. A compression adapter bushing provides a seal between copper tube and old steel service.*



**6**

*Outside, at the main, the new copper service line is connected by means of a compression-type bronze street tee. A temporary expansion plug prevents escape of gas until house connections are completed.*



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# GAS

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*A JENKINS PUBLICATION*

**Twenty-Fifth Year of Publication**

**October, 1949** CCA NBP **Vol. 25—No. 10**


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GAS is published monthly by Jenkins Publications, Inc., 198 South Alvarado Street, Los Angeles 4, California. Subscription price, United States and possessions, Canada, Mexico, Cuba. South and Central American countries (in advance), 50 cents the copy; one year, $2.00; two years, $3.50; three years, $5.00. All other countries, $3.00 per year. Acceptance under Section 34.64, P. L. & R. authorized. Member: The Controlled Circulation Audit, Inc. GAS is indexed regularly by Engineering Index Inc. Publishers: BUTANE-PROPANE NEWS; Handbook BUTANE-PROPANE GASES; BOTTLED GAS MANUAL, WESTERN METALS.

# Highlights

MORE GAS FOR COLORADO. FPC last month told Colorado Interstate Gas Co. to go ahead with plans to boost daily capacity of the company's system by 62 MMcf. Extensive looping of the Hugoton line in the vicinity of Denver and installation of several compressor units and a station at a total cost of $4 million will boost total capacity of the line to 181 MMcf.

SOUTHEASTERN U.S. MAY YET GET NATURAL GAS. Long delayed action on applications of United Gas Pipe Line, Atlantic Gulf Gas Co., and Southern Natural Gas Co. in the Georgia-South Carolina-Florida area, and of Piedmont Pipe Line Co. in the Mid-Atlantic Seaboard region, was finally taken last month. FPC consolidated proceedings on United's, Atlantic's and Southern Natural's petitions, and as *GAS* went to press hearings were well under way. Hearings on the Piedmont application were also in progress. Final decisions on both cases should be forthcoming soon.

COLORADO INTERSTATE IS STILL HAVING RATE TROUBLE. An initial decision by the FPC, issued last month, ordered one volume of Colorado's proposed natural gas tariff accepted for filing but ordered the company to refile the second volume involving Colorado Interstate's sale of gas to Natural Gas Pipeline Co. of America. The approved tariff contains new rate schedules for the sale of gas to distributors in Colorado and Wyoming.

CENTRAL ARKANSAS PLEA WINS FPC APPROVAL. Arkansas Louisiana Gas Co.'s proposed 163-mile, 20-in. line to take gas from Texas to central Arkansas was cleared in mid-September.

SLIDING OIL PRICES PROVE BOON TO SOME, HEADACHE TO OTHERS. Portland (Ore.) Gas & Coke Co. has made its fourth rate reduction this year, which will save customers an estimated $652,000. The new rates place residential users, exclusive of space-heating customers, on approximately the pre-war level. Meanwhile, the oil price situation in California has gasmen worried, and in New York Consolidated Edison set up a budget payment plan to combat possible space heating conversions from gas to fuel oil. Southern California Gas Co.'s dilemma is revealed in a digested article by Arthur F. Bridge in this issue.

NATURAL GAS FOR NEW ENGLAND BY 1951 A PROBABILITY. Newly organized Northeastern Natural Gas Co. is all set to take gas from Tennessee Gas Transmission Co. and Transcontinental Gas Pipe Line Corp. as soon as FPC approves the 3-way proposition. Initial input would be 220 MMcf per day, principally for distribution in Massachusetts. Ramifications of the plan are explained in the "Pipeline Section" in this issue.

ONTARIO'S GAS FAMINE END SEEN. New strikes in Lambton county and new options for Panhandle gas have prompted provincial officials to remove in part lingering wartime restrictions on use of gas for heating.

ALBUQUERQUE UTILITY ACQUIRED BY SOUTHERN UNION. Public Service Co. of New Mexico has contracted to sell its properties for $4 million to the Dallas company.

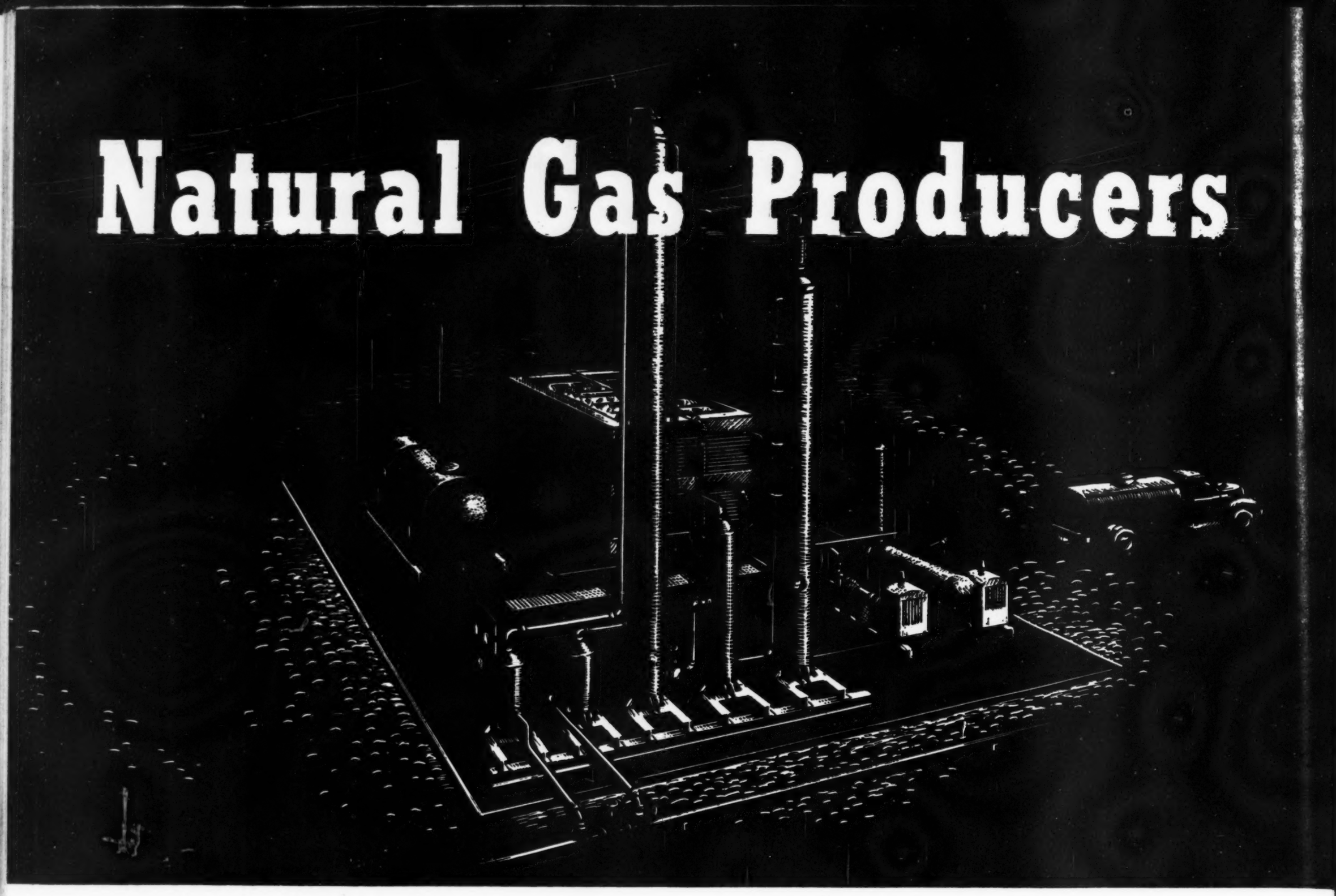
CHICAGO LIQUEFACTION PLANT HANGS FIRE. Chicago District Pipeline Co. remains mum on final plans for the 400-MMcf plant recently approved by FPC (*GAS*, Sept., p. 76). The complete story of the original plan as approved appears on pages 92-100 of this issue.

GOOD NEWS FOR CAST IRON PIPE BUYERS. "Almost immediate" delivery is now possible for almost all sizes of cast iron pipe up to and including 12-in., according to a major producer. Only in certain sizes are three-week or more delays still prevalent.

UTILITY FINANCING HOLDS THE CENTER OF THE STAGE. Increasing attention is being placed on this phase of the industry, as Mr. Titus points out in "Thermally Thinking" in this issue. AGA has just announced the release of a joint study on financing of utility capital expansion programs.

FPC IS LIMPING AGAIN. Seldom in these times up to its full complement of five members, the FPC is still without the services of Leland Olds, whose nomination for another term is still up in the air. With time running out on the Congressional session, it is possible that a recess appointment will be given him until the next session convenes.

# Natural Gas Producers



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# THERMALLY THINKING

By EDWARD TITUS

## keynoter schram

CHOICE OF EMIL SCHRAM, president of the New York Stock Exchange to keynote the 31st annual convention of the American Gas Assn. in Chicago this month emphasizes how leaders of the gas industry are thinking about the $3½ billion for construction through 1952.

Mr. Schram has been doing an active selling job around the country on the free enterprise system. He's also been urging changes in the tax structure which would lead to more desire to invest in common stocks.

These taxes still contain relics of the ultra-New Deal days, when some of the brainy radicals who clustered around the White House seemed more interested in destroying private business than in tax measures solely with a view to their wisdom for raising money for war.

Mr. Schram is highly public relations-conscious. During his regime as head of the Big Board, the gallery of the stock exchange has been open so that visitors could actually see the whole thing in operation. This has done much to dispel the idea that Wall Street inhabitants are ogres. They act about like other people. There are good-looking girls here and there on the floor, and except at times of unusual activity everybody's behavior is pretty human.

Close to a year back, when things looked a bit blacker than today, it was Mr. Schram's thought that the stock exchange itself sell the market out of its slump.

His idea seemed to tie in pretty closely with those of Julien H. Collins, former president of the Investment Bankers Assn., who advocated in security matters "expanding our sales effort to reach today's broader market."

They were both doubtless thinking of the increase in the amount of money that's spread out among people of modest incomes. These people are these days putting nearly all their cash into life insurance, savings bonds and the savings banks, rather than into ventures. Therefore the gas industry and others aren't financing the proportion of their expansion they would like to with common stock—or call it equity securities.

This trend is shown lots of places, including figures on deposits in New York state savings banks. Last May they increased $48 million and the total for the state had crossed the $10 billion mark.

Mr. Schram and the gas industry have a mutual interest in performing an equity securities sales job. In addition to the normal sales effort which investment bankers put in with the usual type of investor, there are two other regions where the effort needs to concentrate:

1. At the grass roots.
2. In Washington.

Justin R. Whiting, as president of Commonwealth & Southern Corp. and Consumers Power Co. before the National Conference of Electric & Gas Utility Accountants, had some to-the-point thoughts on the first.

Mr. Whiting said the shifting of wealth to different groups has raised a new problem (one perhaps might better say "opportunity") in the sale of securities.

Thirteen years ago more than half of families had an annual income under $1000. Ten per cent had $2000 to $3000. And one quarter of families had from $3000 to $5000.

In 1947, on the other hand, the families whose income was under $1000 had dropped to 16%. The group from $2000 to $3000 had gone up to 24%, or just under a quarter of the total. Those from $3000 to $5000 was up to 26%, or more than a quarter of the total.

## new middle group

The last group, the $3000 to $5000 families earn a larger per cent of the national income than any other group, and doubtless it is larger now because income has gone up since 1947.

And these people are in a more favored position as to net income taxes than those of higher income groups who formerly bought the bulk of securities. During the war these people were educated to buy government bonds. In other words, they have been educated to the idea of having their money in something that's represented by a heavy piece of paper which, when read over, defines the obligation of the borrower, or defines the share of the enterprise owned by the holder.

They have been educated to holding a security, as a supplement to what they might put into other forms of investment. They are as willing to accept the security as a neat little book to put in their pocket from the savings bank; or a big piece of parchment that folds and goes into a long envelope too big to put in the pocket from the insurance company; or the least desirable but often used alternative of just saving the greenbacks and putting them under the mattress. (We also know a guy in a higher income bracket who, when he travels in New England where $2 bills aren't regarded as unlucky, picks up all these curiosities he can as a hobby, then stows them away in his safe deposit box in the Southwest).

During the first world war, the public of the day also got some instruction

in putting its money into securities, as the result of the war bond drives of that time. And in the twenties, following this war, the small and medium-income public, particularly utility customers, invested heavily in utility stocks.

The public of today had the same kind of education during the recent war in the advantages of putting funds into something where the obligation is defined on a neatly printed piece of heavy paper. And the same groups as bought utility equity securities after the first world war should be a good market today.

Advantages of having customers, and also employees, as stockholders are obvious. These groups then have an interest in seeing the company make some money.

One should not be so forgetful, however, as to fail to recall the debacle that started in 1929 and continued through the thirties, during which the misfortunes and collapse of a few large utility groups in which the public had invested led to highly unjust public discredit of the utility industry in general. And this in turn was exploited for half a generation by a whole new tribe of Washington demagogues.

Any program of interesting customers and employees in investing in gas industry stocks should proceed with reasonable caution. If a security is a speculation, this should not be concealed. Small investors in these groups could be invited to consider putting something into common stocks, but discouraged from putting a disproportionate amount into such securities, at the expense of what they ought to keep in savings banks and life insurance. There should be no high-pressure salesmen, perhaps not even any salesmen at all; just an invitation to the customer or employee to take some securities if he or she wishes.

One might mention the advertising of the Wall Street, in fact nationwide, firm of Merrill Lynch, Pierce, Fenner and Beane (excuse omission of the names of a few partners!), as having done a job of informing the public on the opportunities from investment and speculation, without any overselling.

Some indication of the chances of success by the gas industry and other utilities in marketing securities with their customers is seen in the success of Pennsylvania Power & Light Co., about a year ago. The company's president announced that more than 97% of an offering of preferred stock had been sold in the state where the company does business; and more than four fifths of the total was taken by people in the part of the state the company covers.

So much for the opportunities of grass roots financing.

## washington outlook

Now for what needs to be done in Washington. A book, in fact a few encyclopedias, could be written on that point. A few hunches on current errors in thinking on utility financing among the boys on the shore of the Potomac were covered in this space in *GAS* in March, 1949.

And a denizen of Wall Street, Eugene Bashore, vice president of Blyth & Co., who journeyed to Santa Barbara to address the Pacific Coast Gas Assn. last month, presented a very sound and thought- provoking analysis of the subject. His talk is digested elsewhere in this issue of *GAS*.

We've made some suggestions above about the opportunities in interesting small investors. Mr. Bashore's remarks were perhaps more applicable to large investors and their failure to take the interest they used to take in providing risk capital, which in turn provided jobs and sped the country's economic progress.

The late Al Smith, after he split with his former friend in the White House, once summed it up by saying in effect that the government, through taxes, was compelling those taking a chance with their money to put too much "in the kitty." In other words, if you lose, you lose your entire loss. If you win, particularly if you're a big-time operator, you really win only a fraction of what you've won.

Discussing just one aspect of this picture, Mr. Bashore declared, "We did a horrible thing back in 1935 when we made corporate dividends fully subject to individual income taxes." He added that the imposition of double taxation on corporate dividends started a chain reaction, the effects of which are now becoming apparent.

The chairman of the Federal Reserve board recently has expressed alarm about the reluctance of American investors to take risks. He put his finger, said Mr. Bashore, on the sore spot, "a scheme of taxation developed to effect social reforms, but which has stifled enterprise and destroyed incentives."

For quite a while it has been easy for the gas industry and others similarly situated to finance through borrowing.

Well, why not go ahead and borrow some more? As an expert, Mr. Bashore answers that too much debt not only interferes with the sale of stock, but precludes further debt financing. It is also asserted that if those who are able to save do not supply risk capital, then in any period when corporate earnings are insufficient to sustain an expanding economy, government will substitute for private enterprise.

In any consideration of financing plans, the gas industry needs to give thought not only to the viewpoint of possible future investors, but also to investors already in the fold, particularly new ones.

The story of the industry's progress is a thrilling one. Its future opportunities are exciting. Let's talk about it.

And such matters as the statement that accompanies the solicitation of a proxy are extremely important. One of the leading firms in downtown New York which specializes in this type of thing has a library of good statements of this kind.

Partly because of government requirements, some proxy documents are so bulky and forbidding that stockholders are said to throw them out, and fail to sign the required document, in the belief that any management that must tell its story in such a complicated manner must be wrong. There are ways of lightening the tone of these solicitations and still fulfilling the requirements.

There are other methods of personalizing contact with stockholders that can be studied and learned.

Mr. Schram may have some suggestions.

## different feet?

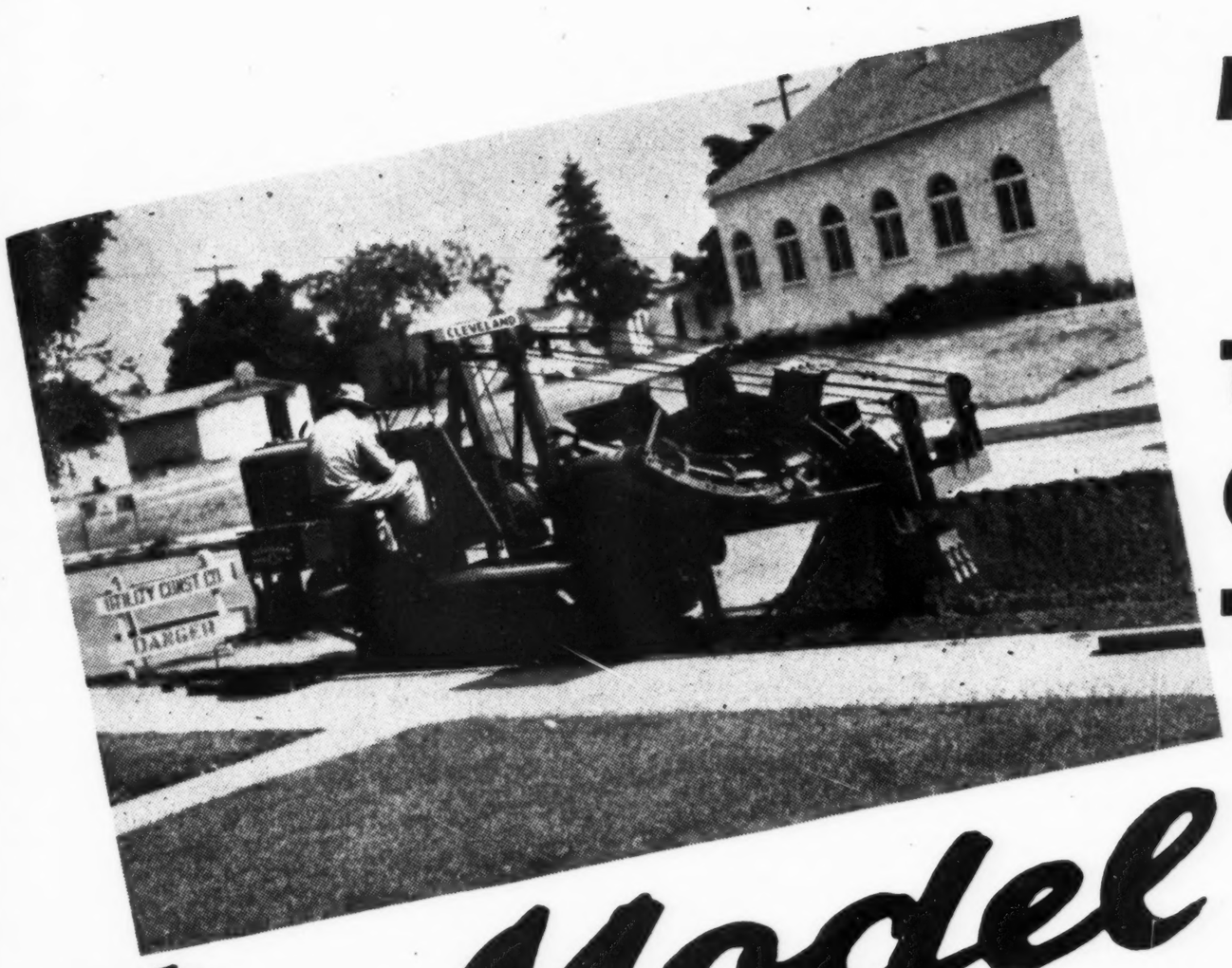
Is THE SHOE on the other foot to stay? Are new high-Btu oil gas processes going to team up with "cheap" gas-making oils to halt the advance of natural gas into new territories? Are changing market conditions going to take a heavy bite out of interruptible industrial loads?

There are straws in the wind. In southern California, natural gas stronghold, tumbling oil prices which are winning new industrial customers, coupled with continually rising costs of doing business which have forced a reluctant rate increase petition, are bringing on a $2 million a year retrenchment in expenditures. In ortland, Ore., manufactured gas rates are skidding back toward pre-war levels.

That the oil price trend, which was most heavily fetl on the West Coast where crude oil overproduction has reached serious proportions, might extend eastward of the Rockies, was foreseen in some quarters when it was announced that some 3 to 5 million barrels of western heavy fuel oil would be shipped to the East Coast.

Or is the present situation merely one of "distress?"

To gasmen in search of answers, we commend A. F. Bridge's article in the "Digests" section of this issue and urge the reading of a significant article on high-Btu oil gas to appear next month.

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# TECHNICAL TRENDS

by Guy Corfield

## "Upgrading" Natural Gas

THE AUGUST 1949 ISSUE of *Oil and Gas Journal* carries an article on the Spencer Chemical Co. plant near Pittsburg in southeastern Kansas, where natural gas is the "starting ingredient" in the manufacture of ammonia, ammonium nitrate, methyl alcohol and dry ice. Other basic ingredients are steam and air, and considerable purchased electrical energy.

Very briefly, the natural gas and steam are reacted over a nickle catalyst at high temperature to form hydrogen, carbon dioxide and carbon monoxide, plus introduction of air to provide nitrogen: the mixed gases, plus more steam pass over an iron oxide catalyst to convert the carbon monoxide to carbon dioxide and produce additional hydrogen; the resultant mixture is compressed to 250 psig and scrubbed with water to remove the bulk of the carbon dioxide, and then further compressed to 1800 psig and scrubbed with cuprous ammonium formate to remove carbon monoxide, and with aqua ammonia to remove last traces of carbon dioxide; the resultant hydrogen and nitrogen are then compressed to 5000 psig and passed and recycled through synthesis equipment wherein they are converted to ammonia; part of the ammonia is burned in air over a platinum gauze catalyst to form nitrogen oxides which are absorbed in water to produce nitric acid; and, finally, nitric acid and ammonia are reacted to form ammonium nitrate.

It is interesting to note that this "huge ultramodern petro-chemical plant" uses between 10 and 37 MMcf of natural gas per day, and expects ultimately to increase this to 20 to 45 MMcf per day. With no thought of minimizing the magnitude of this operation, this appears to confirm earlier indications and statements that the volumes of natural gas that may be used for chemical manufacture are relatively negligible and will have no significant influence on pipeline demands for fuel purposes.

The natural gas "upgrading" aspect is developed in the article through analysis and reasoning as follows: $10 worth of natural gas (and coal for electric energy and plant fuel) will produce one ton of ammonia which can be converted into two tons of ammonium nitrate fertilizer which when sold in the Kansas farmland will cost $140. However, when this two tons of fertilizer is applied to 40 acres of corn the *increased* yield is about 720 bushels which at today's prices means $1000 of additional income.

## Deep Photography

A FEW MONTHS AGO, in this column, admiration was expressed at the ingenuity with which tools are developed and used, at great depths, in gas and oil wells. Another example of this is a recent development by William E. Crane and Russel Journigan, president and design engineer respectively of the Deep Tube Photo Survey Co. of Long Beach, Calif. They have constructed and used successfully a self-contained and self-illuminated camera assembly which, when lowered down a well, will take pictures of the casing at desired depths.

It can be used at pressures up to 4500 psi and temperatures up to 200° F, and under water. It incorporates a plumb bob, the position of which is recorded on the photograph which thereby indicates the inclination of the casing as well as other details. The overall assembly is about 6 ft long.

This apparatus was developed primarily for exploration of well casing damage in the Wilmington field in California, where a problem of subsidence, and formation slipping at about 1600 ft, has been encountered. The camera has also been used to check the condition of perforations in water well casings.

## Big Business

ACCORDING TO THE NATIONAL City Bank of New York the 25 largest manufacturing corporations, as of early 1949, were as follows:

Standard Oil Co. of New Jersey
General Motors Corp.
U. S. Steel Corp.
E. I. Du Pont de Nemours & Co.
Standard Oil Co. of Indiana
Socony-Vacuum Oil Co.
Texas Co.
Gulf Oil Corp.
General Electric Co.
Standard Oil Co. of California
Bethlehem Steel Corp.
Ford Motor Co.
Cities Service Co.
Western Electric Co.
Union Carbide & Carbon Corp.
Sinclair Oil Corp.
Westinghouse Electric Corp.
American Tobacco Co.
International Harvester Co.
Anaconda Copper Mining Co.
Shell Union Oil Corp.
Allied Chemical & Dye Corp.
Phillips Petroleum Co.
Kennecott Copper Corp.
Chrysler Corp.

As might be expected, they are largely technical in background and basic operation, and dominated by oil.

While the average person is fascinated by size, whether in a business, a city, or a mountain, many distrust big business and the Antitrust Division of the Department of Justice is persistently trying to limit the larger corporations on the general premise that big business is bad. Why it is bad, and how big is big, do not seem to be clear and will probably never be precisely answered. The trend, however, is decidedly interesting to technical men because the large corporations, which it must be admitted have been technically successful, vigorously assert that size is necessary to finance and undertake the research and development that must precede and contribute to this technical success.

# PROMOTIONAL NOTES AND NOTIONS

by Stanley Jenks

## The Tax Burden

IT'S PRETTY HARD these days to keep up with the much "Vaughanted" goings-on in the Washington Whirlpool, as Congress blithely votes more and more deficit dunnings to be forked over by Mr. & Mrs. John Q. Public.

Federal taxes alone amount to $1073 per family, and, because we are especially interested in the group purchasing power of the family, the significance of that figure is very important to us, since it drains the resources of our customers to buy gas appliances and services.

Of course, the average direct income tax payment is not $1073 per family. That's the vicious part of it. So much of it is hidden in corporate taxes, so-called wartime "luxury" taxes, and other sources, generally unsuspected by the would-be "welfare" beneficiaries. It is hard to believe that such a condition could continue to exist if the real facts were known. The welfarers dangle the "free" bait so temptingly. They sell memberships in their federal "Share-the-Wealth" club to the masses, to be financed by the classes, and completely ignore the tremendous burden they are imposing on industry, the only creator of real national wealth.

There can be no doubt that the promotional end of our business is being seriously affected by a federal annual taxation burden of $1073 per family, especially when you appreciate that the annual food purchases of the average family amount to $751, and furniture, appliance, and radio purchases to $165, according to *Sales Management*.

An intelligent public interest in federal taxation is badly overdue, and arousing it seems a worthwhile extra-curricular activity for every salesman who knows on which side his bread is buttered.

## Inventory Pressure

ANOTHER OVERDUE ITEM is the revival in refrigerator sales. The leading manufacturers, who really took a licking earlier in the year, are stepping up their output to refill dealer inventories.

It is almost axiomatic in normal appliance merchandising that inventory pressure is a necessary ingredient to spur on dealer sales effort.

While I am no advocate of the vicious practice of loading a dealer's inventory to the point of desperation, where he is driven to unethical and costly lengths to get from under, I know from long personal experience that the promotional grey matter gets more exercise when it is undergoing inventory pressure. Every time you walk through the storeroom, you see those crates literally taunting you to turn them into cash to meet payrolls, pay the rent, and finance a new bonnet to gladden the heart of the little woman.

The tie-up between rate-of-turnover and net profit becomes more acute, and there's a diminishing desire to go to the ball game or take in an early movie.

## Debt Pressure

MY FIRST BOSS in the utility merchandising field, to get his salesmen hustling, had a system of his own, perhaps best described as debt pressure. The new salesman was the "victim." The ostensible theory was that a salesman could do a much better selling job on an appliance if it were being used in his own home. Therefore, after a preliminary appraisal of his ability, he was persuaded to buy a gas range, automatic water heater, or refrigerator on irresistibly easy terms, the payments to be deducted from his pay check. The real idea, however—and it sounds crudely brutal—was to load him up with debt to keep his thumb on the doorbells. Undoubtedly, in some men it created an urge to work, but I feel it can scarcely be condoned as a sound basic policy.

There are far worthier incentives, such as adequate compensation and opportunities for advancement, to keep a salesman on the beam. The lad who has to be squeezed economically before he can be made to work is either unsuited for the job or else he needs better supervision.

## Anti-Socialistic

ALTHOUGH THE ELECTRIC utility industry is apparently the first objective of the Truman troughers in their nationalization program, we must never forget that the socialistic concept is the state ownership of all utilities. They have us on their list too. The electric utility industry fight is our fight, and the counter measures to this socialistic slop being taken by many electric utilities (some of which are so-called combination companies) merit our active support.

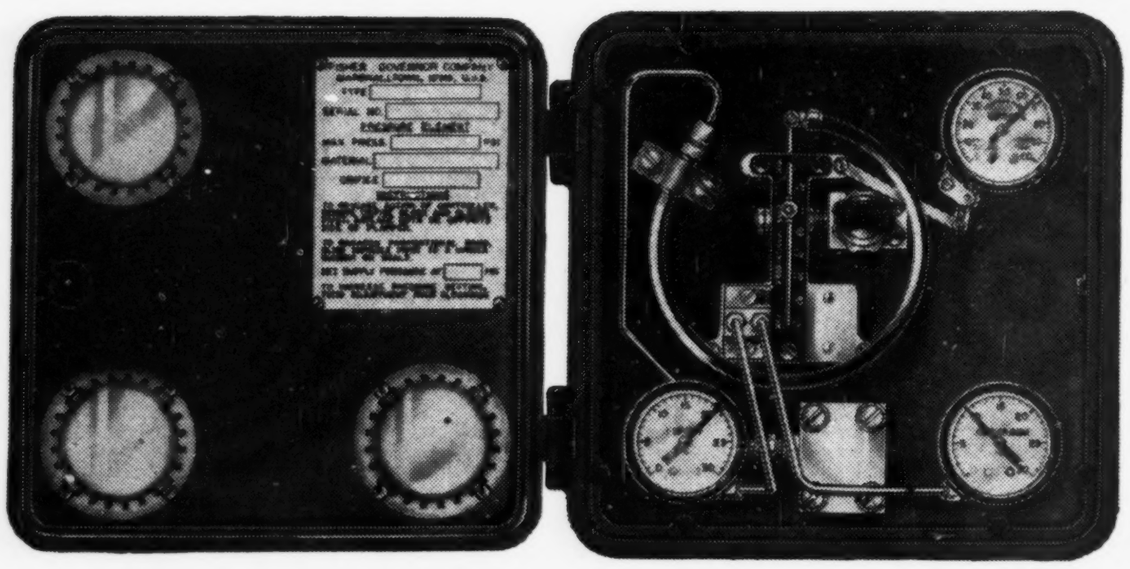
The only plausible pretext for nationalizing any industry is that it is for the public's welfare, that is, the bureaucrats can operate it more efficiently and at lower costs than private management. To the average customer, who thinks in terms of self-interest, this means lower rates. I commend the Consolidated Edison System of New York for anticipating this so vigorously in its series of "Current Topics" newspaper advertisements. They cut out the highfaluting and get right down to cases.

"Do you know that 5 cents will buy enough electricity to shave you every day for four years?" they ask.

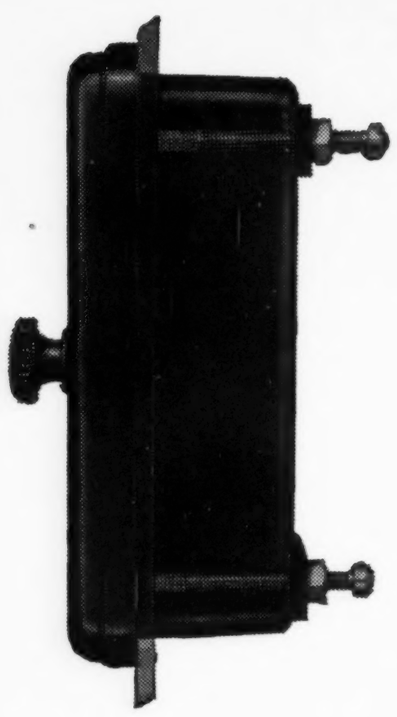
"Five cents buys enough electricity to give you 35 hours of perfect refrigeration," they say.

In your territory, do your customers know how much gas cooking they can get for 5 cents, or how many gallons of hot water, or how many hours of refrigeration their gas nickel buys for them? If they don't, you couldn't pick a better time to start telling them.

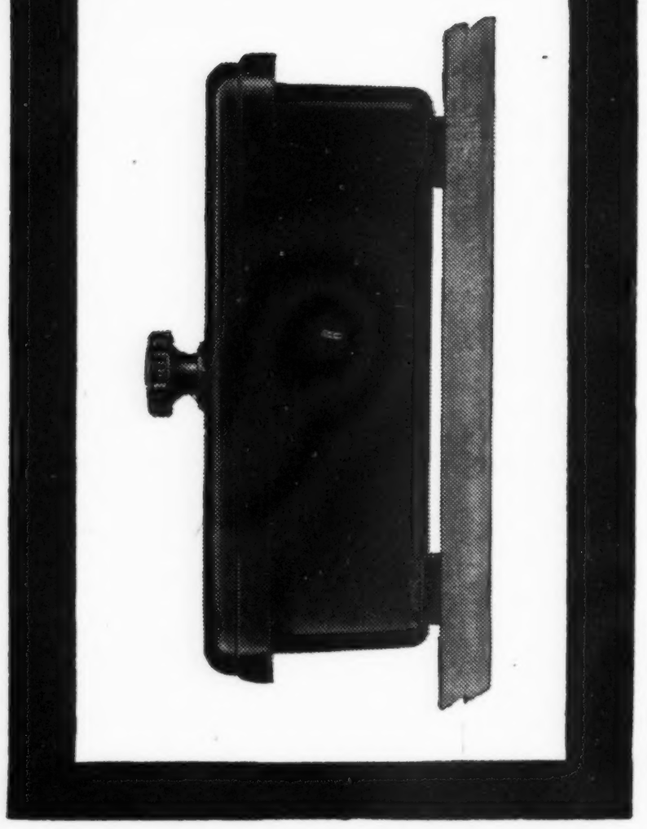
**Your Favorite Dependable WIZARD...in a new gas-tight weather-proof case for flush or surface panel mounting**



Type 4100U remote mounting Wizard with cover open.



Side view Type 4100U for flush mounting.



Side view Type 4100U for surface mounting.

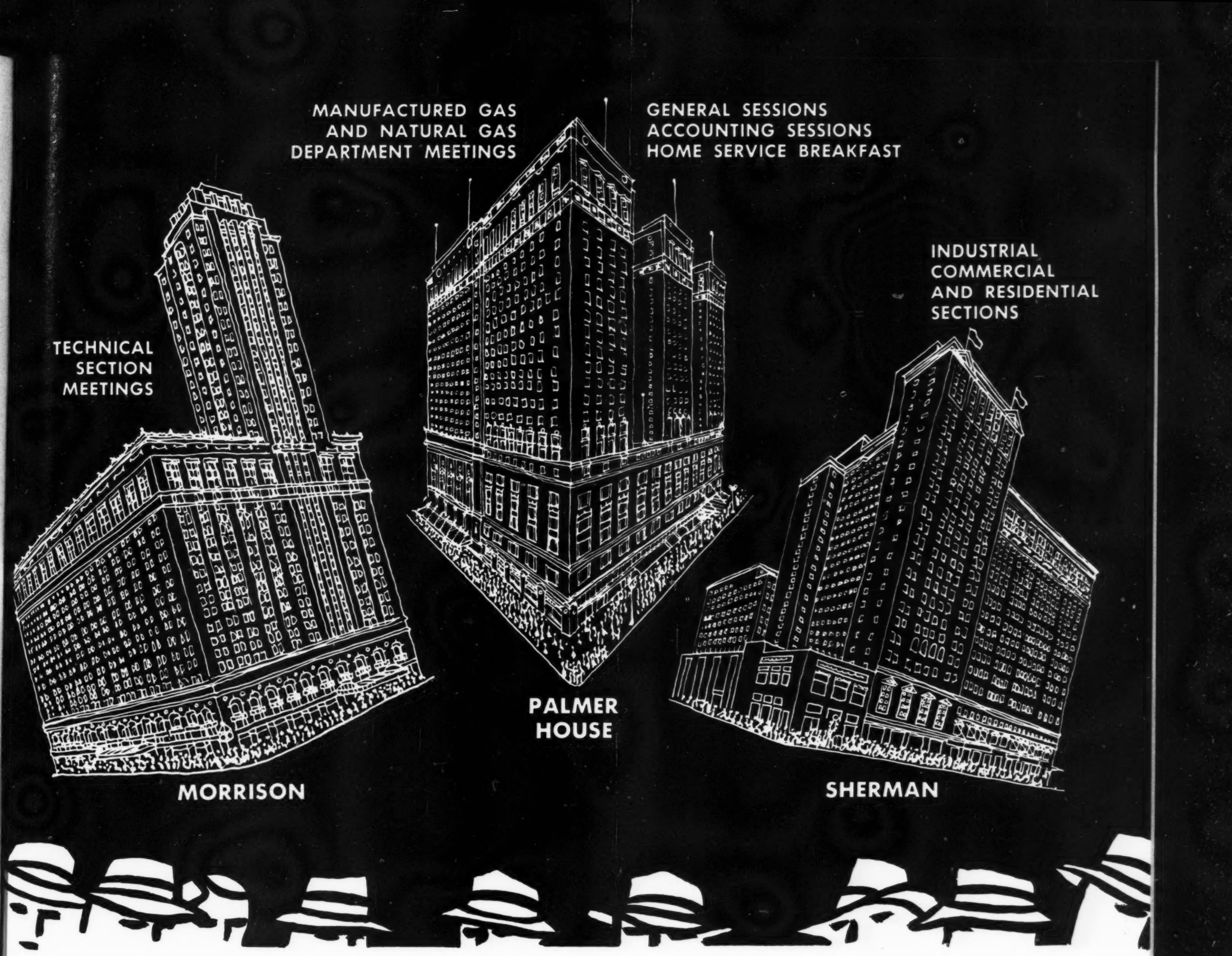
Universal case adapts Wizard to flush or surface panel mounting and also to valve yoke mounting.

Available with either bellows or Bourdon tube measuring element, for pressures from inches W. C. to 10,000 PSI.

Simple knob adjustment for controlled pressure setting, indicated on calibrated dial.

WRITE TODAY FOR BULLETIN D4

**FISHER GOVERNOR CO.**
**MARSHALLTOWN, IOWA**




# AGA Convention Calls Gasmen To Chicago

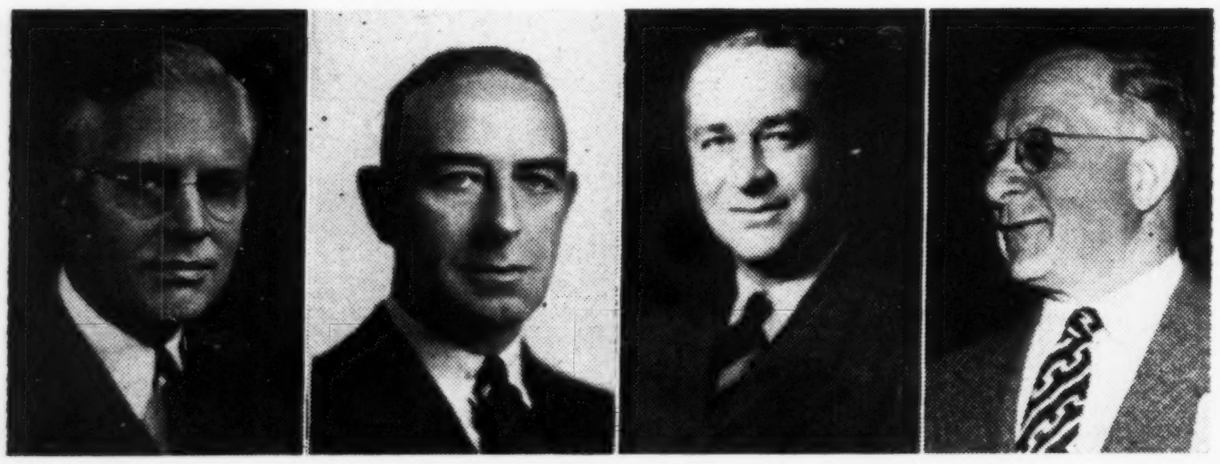
SIX thousand gasmen from all over the nation are due to hit the road to Chicago this month, there to meet for the 31st annual convention of the American Gas Assn., Oct. 17-20. "Gas Has Got It" will keynote the meeting, serving to remind delegates of the great strides made within the industry during the year.

Three Windy City hotels will house the meetings, technical sessions, and entertainments of the four-day conclave. General sessions, accounting sessions, the home service breakfast, and manufactured gas and natural gas department meetings will be held in the Palmer House. Industrial, commercial, and residential gas section delegates will meet in the Sherman hotel; and technical section members will gather in the Morrison hotel. The separation of convention delegates by section for the business and technical sessions marks a new practice by AGA, and is designed to increase the yield of the various programs.

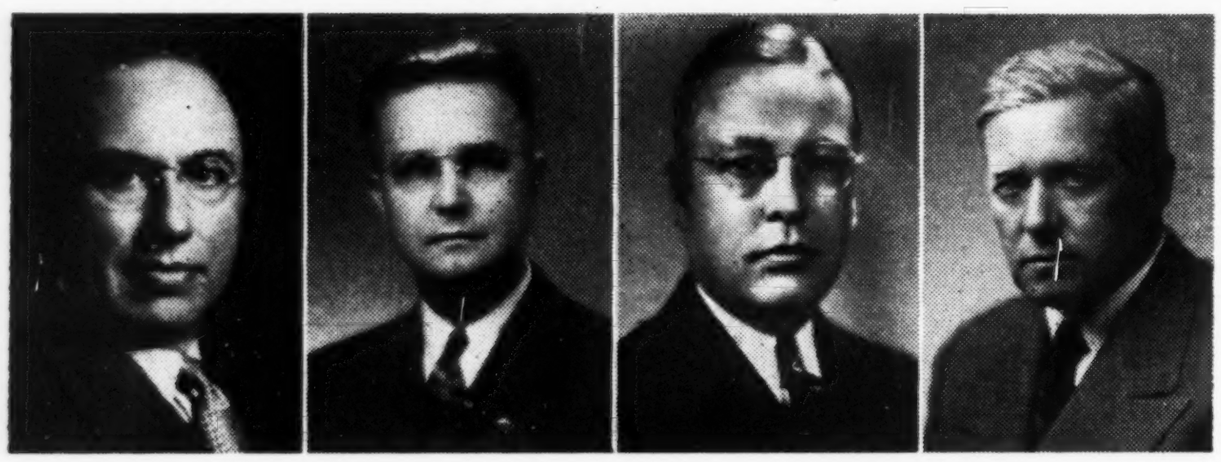
Subordinant to the theme of the convention will be its title, "'49 Round Up," signifying the industry's current promotional efforts in rounding up old and worn out cooking stoves.

Under chairman George F. Mitchell, president, Peoples Gas Light & Coke Co., Chicago, AGA's convention committee has scheduled a strong program for the conclave. Heading gas industry guests who will speak before delegates are Emil Schram, president of the New York Stock exchange, and Harry

# DIRECTORS

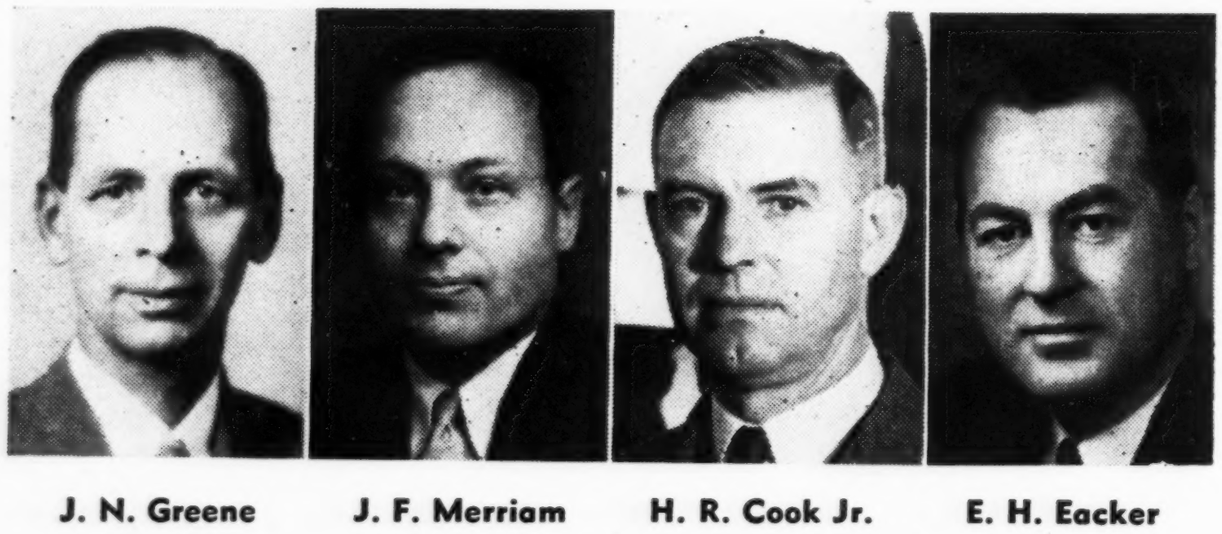


S. H. Hobson — Thomas Weir — C. G. Young — E. G. Boyer

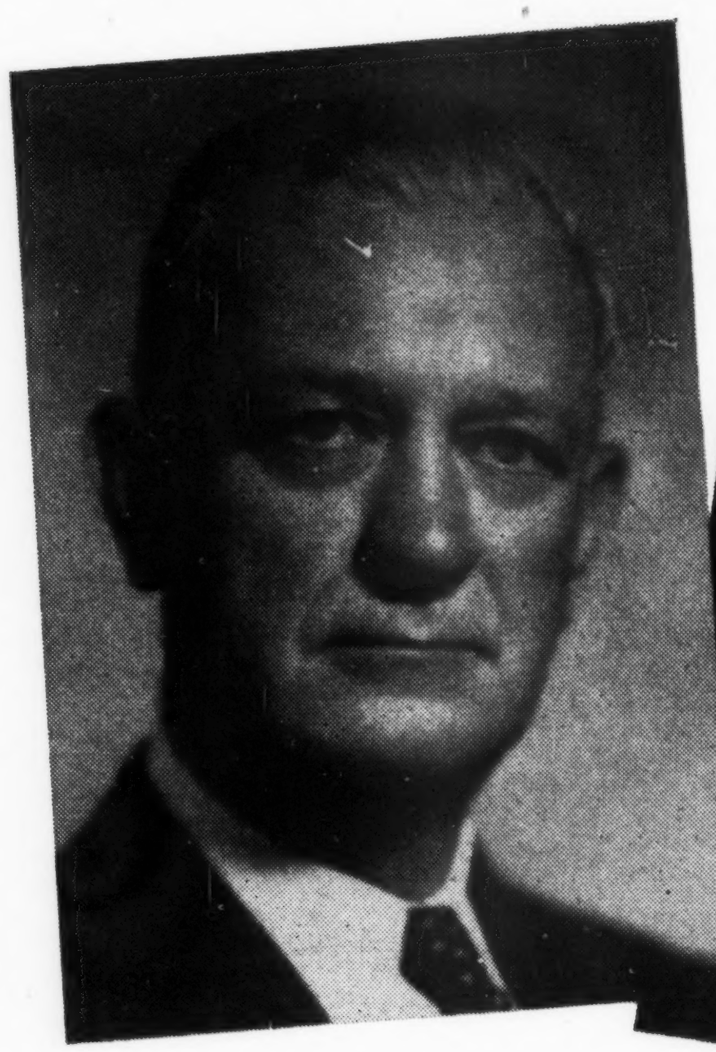


J. F. Robinson — C. H. Zachry — D. H. Mitchell — H. K. Wrench

P. R. Taylor — F. A. Lydecker — R. H. Lewis — J. S. Moulton



J. N. Greene — J. F. Merriam — H. R. Cook Jr. — E. H. Eacker



Left: Hugh H. ... rell, AGA pres... elect

Below: D. A. ... new first v... presiden...

**DIRECTORS**

E .G. Boyer, Philadelphia Electric Co.
H. R. Cook Jr., Consolidated, Baltimore
E. H. Eacker, Boston Consolidated
J. N. Greene, Alabama Gas Corp.
S. H. Hobson, Geo. D. Roper Corp.
R. H. Lewis, Ruud Manufacturing Co.
F. A. Lydecker, Public Service, Newark
J. F. Merriam, Northern Natural, Omaha
D. H. Mitchell, Northern Indiana Public Service
J. S. Moulton, Pacific Gas & Electric
J. French Robinson, East Ohio Gas Co.
P. R. Taylor, Consolidated Electric & Gas, N. Y.
Thomas Weir, Union Gas Co. of Canada
H. K. Wrench, Minneapolis Gas Co.
C. H. Zachry, Southern Union, Dallas
C. G. Young, Springfield (Mass.) Gas Light Co.

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Industrial, Commercial: D. W. Reeves, Oklahoma Natural Gas Co.
Manufacturers: C. A. Schlegel, United Engineers & Constructors Inc.
Residental: H. P. Morehouse, Public Service Electric & Gas Co.
Technical: E. G. Campbell, Peoples Gas Light & Coke Co.
Laboratories: A. F. Bridge, Southern Counties Gas Co.
Publicity: R. G. Barnett, Portland (Ore.) Gas & Coke Co.

**VICE CHAIRMEN**

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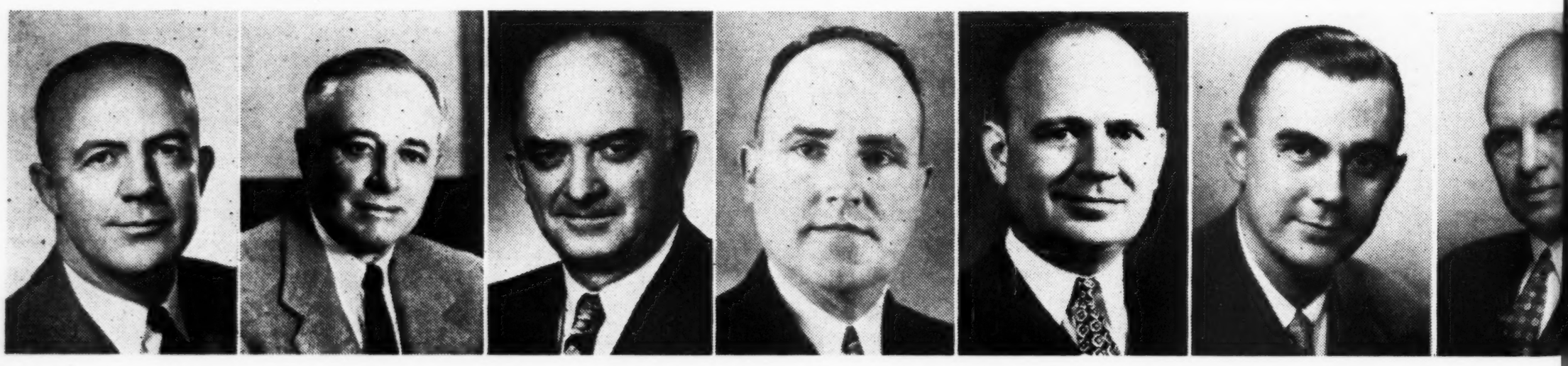
Industrial, Commercial: C. H. Lekberg, Northern Indiana Public Service Co.
Residential: C. H. Horne, Alabama Gas Corp.
Technical: R. Van Vliet, New York & Richmond Gas Co., Staten Island
Laboratories: C. E. Bennett, Manufacturers Light & Heat Co., Pittsburgh
Publicity: C. J. Allen, Connecticut Light & Power Co., Waterbury

# CHAIRMEN

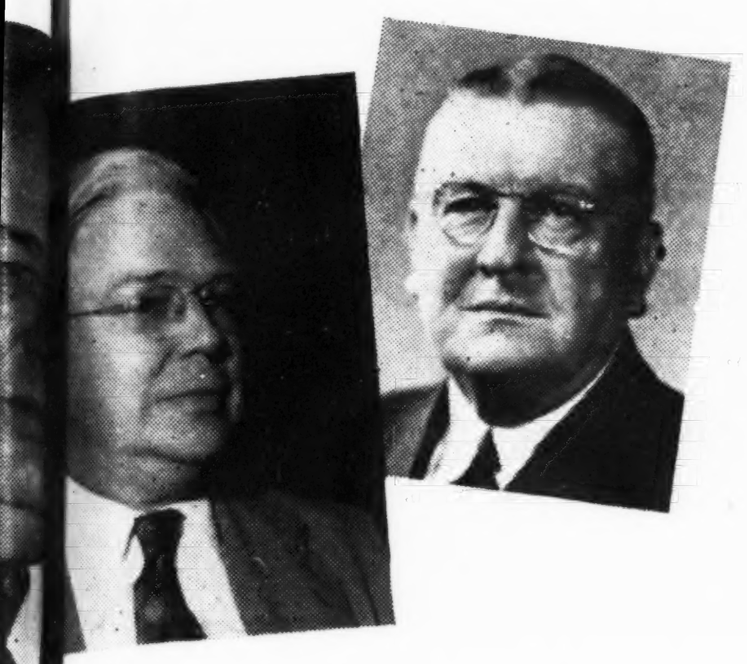
R. G. Barnett — A. F. Bridge — E. G. Campbell — H. P. Morehouse — D. W. Reeves — J. H. W. Roper — C. A. S...



# EXECUTIVES

G. F. Mitchell, nominee for second vice-president.

E. F. Barrett, on ballot for treasurer.



M. Miller, chairman of the Ohio Public Utilities Commission and newly elected president of the National Assn. of Railroad and Public Utilities Commissioners. Mr. Schram will discuss equity financing and Mr. Miller is scheduled to speak on "Duplication of Regulation."

Among other extra-industry speakers will be Henry S. Beers, vice president, Aetna Life Insurance Co. ("Three Phases of 1949 Pension Attitude"), Dr. Ned H. Dearborn, president, National Safety Council ("Safety is Your Business"), and Dr. Henry T. Heald, president, Illinois Insitute of Technology ("Training of Technical Manpower").

In all, there will be 20 meetings and sessions during the four days. Three general sessions, to be held at 10 a.m. on Oct. 18, 19, and 20, will draw the total assemblage; 17 more departmental and sectional meetings will be held within the various industry divisions. All general sessions are slated for the ballroom of the Palmer House.

To head the widespread activities of the American Gas Assn. during the coming year, the general nominating committee has selected 33 prominent gas industry executives. For president, the group has named Hugh H. Cuthrell, vice president, Brooklyn Union Gas Co. (Brooklyn). His aides will be, subject to approval by convention delegates, D. A. Hulcy, president, Lone Star Gas Co., first vice president; George F. Mitchell, president, The Peoples Gas Light & Coke Co., second vice president; and Edward F. Barrett, president, Long Island Lighting Co., treasurer.

Two amendments to Article V of the AGA constitution were approved unanimously by the executive board Aug. 31. Convention delegates will vote (1) Whether to provide for appointment of one or more assistant managing directors, assistant secretaries, and assistant treasurers, to be appointed at the discretion of the executive board, and (2) Whether to change the name of the technical section to operating section.

In addition to election of officers and technical and business meetings, gasmen will find a program of entertainment waiting for them in Chicago. Following tradition, this extracurricular activity will be highlighted by the president's reception and dance, on the evening of Oct. 18, in the grand ballroom of the Palmer House. A special attraction at the dance will be the appearance of the famed Tebala Shrine Male Chanters Chorus, of Rockford, Ill. Benny Sharp and his orchestra will supply music for dancers.

While Mr. Gas is working, AGA committees will see to it that Mrs. Gas is playing. There will be a ladies' party on Wednesday afternoon, Oct. 19, in the Terrace Gardens of the Morrison hotel. Refreshments, door-prizes, and entertainment are to be offered.

Nine busses daily will be available through the Chicago Sight-Seeing Co. for tours of the city. In addition, arrangements have been made for delegates to the convention to play golf at the world-famed Tam O'Shanter club.

Addresses, roundtables, discussions, and yes, even golf, will help the gas industry meeting in Chicago to point to another year of "Gas Has Got It."

## Convention Guide

**GENERAL SESSIONS**
Tuesday, 10 a.m.
Ballroom, Palmer House

Wednesday, 10 a.m.
Ballroom, Palmer House

Thursday, 10 a.m.
Ballroom, Palmer House

**NATURAL GAS DEPT.**
Monday, 10 a.m.
Red Lacquer Room, Palmer House

**MANUFACTURED GAS DEPT.**
Monday, 2 p.m.
Red Lacquer Room, Palmer House

**RESIDENTIAL GAS SECTION**
Tuesday, 2 p.m.
Grand Ballroom, Hotel Sherman

**TECHNICAL SECTION**
Tuesday, 2 p.m.
Mural Room, Morrison Hotel

Wednesday, 2 p.m.
Mural Room, Morrison Hotel

Thursday, 2 p.m.
Mural Room, Morrison Hotel

**INDUSTRIAL and COMMERCIAL GAS**
Wednesday Noon Luncheon
Bal Tabarin, Hotel Sherman

Wednesday, 2 p.m.
Bal Tabarin, Hotel Sherman

**CUSTOMERS ACTIVITIES GROUP**
Wednesday, 2 p.m.
Dining Room 14, Palmer House

**HOME SERVICE BREAKFAST**
Wednesday, 10 a.m.
Ballroom, Palmer House

**ACCOUNTING SECTION**
Tuesday, 2 p.m.
General and Customer Accounting
Dining Rooms 15, 16—Palmer House

Tuesday, 2 p.m.
Materials and Supplies Accounting
Dining Rooms 15, 16—Palmer House

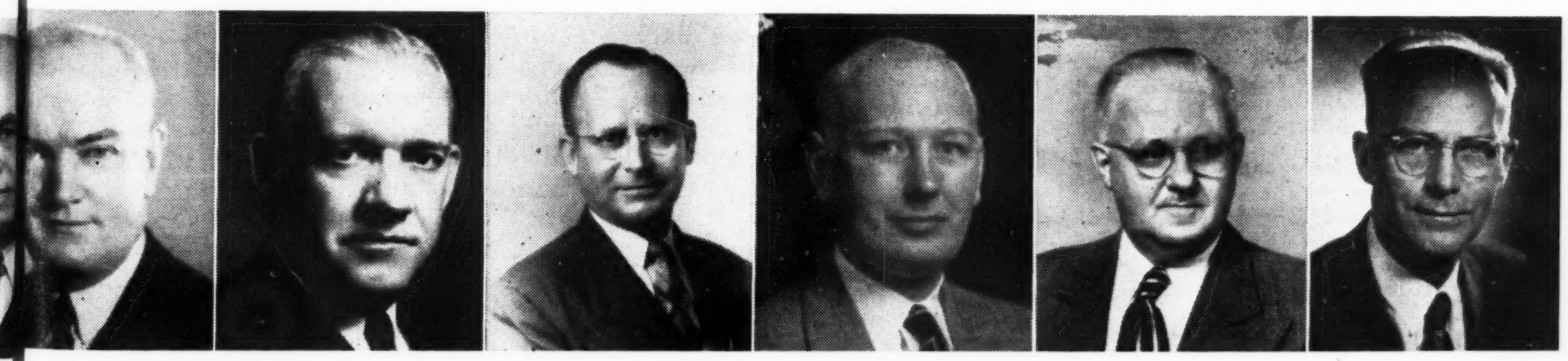
Wednesday, 2 p.m.
General Accounting
Dining Room 18, Palmer House

Wednesday, 2 p.m.
Handling of Truck Stocks
Dining Rooms 15, 16—Palmer House

Thursday, 12:30 p.m.
Accounting Section Luncheon
Red Lacquer Room, Palmer House

# VICE CHAIRMEN

J. Allen — C. E. Bennett — C. H. Horne — A. A. Cullman — C. H. Lekberg — R. Van Vliet



# The Capacity Of Balanced Valve Regulators

By ALLEN D. MacLEAN

**ALLEN D. MacLEAN, author of this article, is a native of Massachusetts. He attended elementary schools in Plymouth, and entered Harvard college in 1914. His graduation four years later (with a bachelor of science degree) immediately preceded his enlistment in the U. S. Army air service.**

**He emerged from the service a second lieutenant in 1919, and joined the New Departure division of General Motors Corp. as sales engineer and assistant chief engineer. He remained in this position until 1926, at which time he became chief engineer of Pittsburgh Equitable Meter Co. (now a division of Rockwell Manufacturing Co.) Mr. MacLean later served Pittsburgh Equitable as vice president.**

**From 1942 to 1945, Mr. MacLean was on leave from his duties with Pittsburgh Equitable, serving first as assistant director and later as director of production, U. S. Maritime shipbuilding program.**

**In the period 1945-46, he served as general manager of the Quinby Pump division of the H. K. Porter Co., and from 1946 to 1949 worked in development and directed the Lubricated Plug Valve division for the H. K. Porter Co.**

**In April of this year, Mr. MacLean became chief engineer of the Chaplin-Fulton Manufacturing Co., Pittsburgh.**

A very essential component in gas production, transmission and distribution is the pressure regulating device used at various points to control the gas pressure. Pressure control is necessary for safety, for accuracy in volumetric measurement, for efficiency in utilization and to reduce leakage and other losses. In transmission and distribution work, the balanced valve design, because it balances statically any pressure differences across the regulators, and because it presents a large through-flow area in a rather small space, is widely used, and for the larger sizes—2-in. and above—is practically the only type employed in gas work.

In selecting a regulator size to apply to a certain situation where the desired outlet pressure, the minimum inlet pressure and maximum flow rate are known, the choice must necessarily be based on published tables and formulae provided usually by the manufacturer. A review of the data presented by a number of such sources reveals a wide discrepancy in values, even where the valve size—one of the essential factors in determining capacity—is the same. In some instances quantities are published with the recommendations that one-half, or one-third, or some other modifying percentage be used. This is, of course, confusing to the engineer charged with installing the proper size regulator, and the purpose of the experimental work on which this paper is based, was to eliminate such uncertainties and to provide a method whereby accurate selection could be made.

One reason which leads to the past practice of using one-third, one-half, etc., of the published capacities was the fact that regulator performance in maintaining the outlet pressure constant was not duly recognized as a contributing factor in determining capacities. As a result, what has been facetiously called an "ignorance factor" had to be applied. In the work now being described the role of control accuracy was duly considered, and experimental work was performed to evaluate definitely its influence on regulator capacity.

In the first elemental approach to regulator capacity, it is obvious that the regulator itself in its open position is a restriction in the line and must cause some pressure loss. Later we will see that the open position should be defined more accurately, for the stroke or lift of the valve is definitely a factor in control accuracy. It will be developed that for most simple valve designs, this stroke should not be any greater than one-fourth of the valve diameter. (Some increase in stroke can be allowed in V-Port, skirted, or characterized valves.) Hence, flow restriction or what we might call the orifice characteristics of the regulator with the valves set at an opening of one-fourth of the valve diameter is a matter for consideration. By flow restriction is meant resistance of the entire regulator from inlet to outlet, and not only that of the valves. This factor can be determined experimentally, as will be described.

In considering the influence of control accuracy on regulator capacity, it is necessary to list briefly the various means of acquiring this control. The simplest regulator uses a diaphragm of flexible material subjected to pressure to be controlled on one side, and a weight (and atmospheric pressure) on the other. A spring may be substituted for the weight, or a lever and weight system can be used. As we will see later, due to variation in effective area of this diaphragm as it moves with the valve from the closed to open position, there is a distinct fall-off in the controlled outlet pressure. This in many instances may be greater than the conditions of the installation may permit. It will be developed later that

Exclusive

this fall-off in controlled pressure has a definite relation to valve stroke, and hence regulator capacity.

Later designs in regulators, recognizing the disadvantages to operation of this outlet pressure fall-off with increasing flow rate, employed a pressure loading, pilot controlling, and instrument type controlling. In most of these designs, by using small units as control response members, forces can be applied to the valve positioning diaphragm in such a way as to maintain the controlled outlet pressure with no fall-off as flow rate increases, or with a small or negligible fall-off.

## Capacity Defined

It is obvious under these conditions, that the capacity of the regulator is the amount of gas which will flow through the regulator, with the valves in their open position, and with a predetermined allowable pressure loss across the regulator. In the formulae and capacity tables presented here, the capacity is the amount of gas passed with the known difference of pressure across the regulator, and with the valves open at a stroke equivalent to one-fourth of the valve diameter. This presupposes the use of pilot loading, pilot controlling or instrument controlled designs.

When weight loaded, or lever and weight systems are used, the control accuracy must be recognized as a factor in determining capacity. A degree of expected accuracy in controlling outlet pressure must be preselected, and by using curves provided, the capacity table values can be modified. To use an example, if it is decided that the lever and weight system is to be used, with a nominal outlet pressure of 30 psi, but with a permissible fall-off in pressure with increasing flow of 10%, i.e. to 27 psi, the capacity as given by the formulae must be modified and limited to the capacity corresponding to the limited valve motion required to produce this degree of accuracy.

If, however, the conditions of the installation are such that a 20% fall-off to 24 psi can be tolerated, then a longer valve stroke is permissible, and a larger percentage of the published capacity may be used. As stated above, the quantitative values for this modification in capacity will be given later in this paper, after we have determined the maximum or no fall-off capacity.

## Capacity of Double Valve Regulators

The basic formulae for the capacity of double valve regulators is the same as that for the flow of gas through any restriction or orifice, for flows in the turbulent range, i.e., above viscous flow. The formula usually takes the following form:

$$Q = K \sqrt{P_o\ (P_I - P_o)}$$

where Q = rate of flow usually expressed in cubic feet per hour at a pressure base of 4 oz above atmospheric pressure, and for a gas of .6 sp gr.

$P_o$ = the absolute pressure at the regulator's immediate outlet.

$P_I$ = the absolute pressure at the regulator's immediate inlet.

K = an orifice factor which is a constant for the particular regulator being considered.

The only exception to the above formula is for a flow rate which equals or exceeds the critical velocity of the gas. It can be shown that when the outlet pressure absolute is equal to or below .528 of the inlet pressure absolute, the gas has reached the critical velocity (for the average fuel gas) and will never go faster. The only increase in the amount of gas delivered then will be occasioned by the fact that the density of the gas moving through this critical velocity area increases in direct ratio to the absolute pressure of the inlet gas. When this volume is reduced to the volume Q, which is expressed at atmospheric pressure plus 4 oz, this volume will be proportional to the inlet pressure absolute.

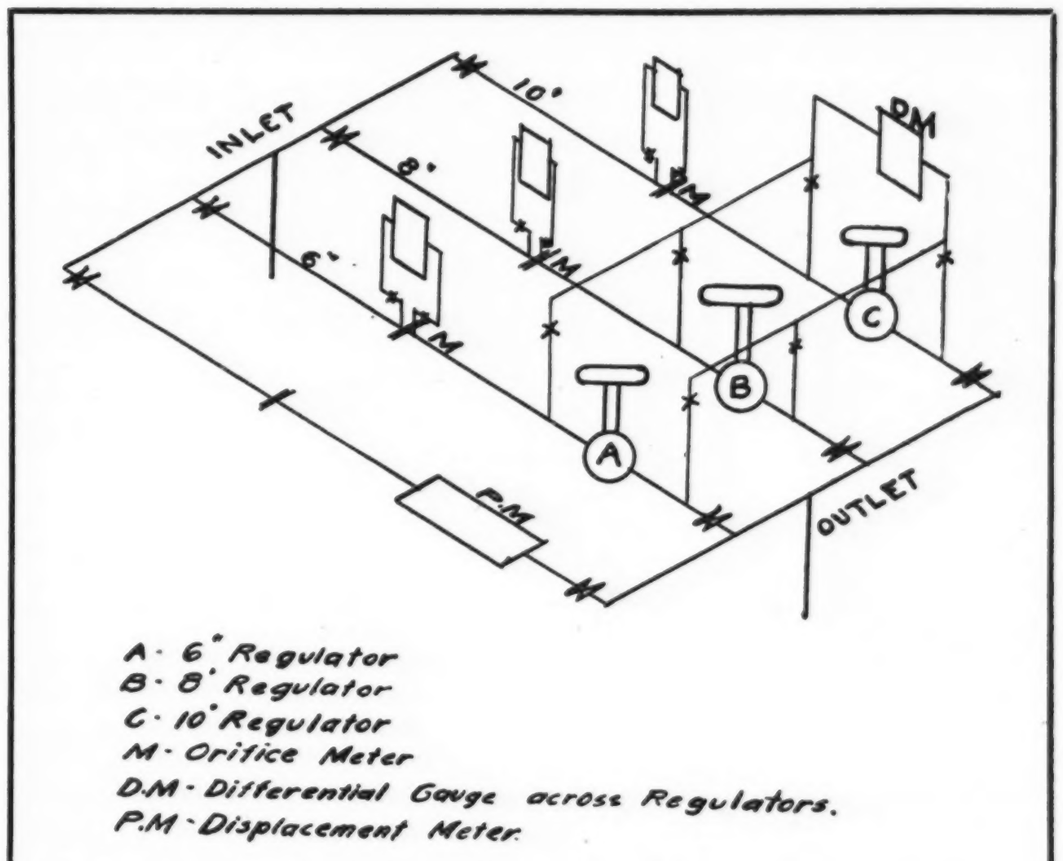



**Fig. 1. Test arrangement used to determine flow factors for pressure regulator capacities.**

As we reach the point of critical velocity through any regulator, we will have the following condition.

$$P_o = .528\ P_I \text{ or } P_I = 1.894\ P_o$$

and substituting in formula (I) above, we have

$$Q = K \sqrt{P_o\ (1.894\ P_o - P_o)} = K \sqrt{P_o \times .894\ P_o} = .945\ K\ P_o$$

Since the flow above critical velocity is proportional to $P_I$, the inlet pressure absolute, we can write for any $P_I$ above the critical value.

$$Q = .945\ KP_o \times P_I/1.894\ P_o = .945/1.894\ KP_I = .5KP_I$$

The value K for the ordinary balanced valve regulator will vary with several factors including the following: diameter of valve openings, area of other restrictions in the flow path through the regulator, type of guide used to guide the valve (i.e. wing guides, skirt guides, center guides, etc.), permissible maximum lift of valve from the closed position to the wide open position.

## Determining Regulator Ability

To determine the true ability of the regulator to pass gas, it was necessary to conduct tests which permitted accurate reading of the pressure loss across the regulator, $P_I - P_o$, and also accurate measurement of the flow rate, Q. To do this, a meter setting of the Manufacturers Light & Heat Co. at Beaver Falls, Pa., as sketched in *Fig. 1* was used. This setting was equipped with 6-, 8-, and 10-in. regulators used as differential shutoff valves, having, however, the bodies, valves, etc., of the standard pressure reducing regulators. A 20-in. differential gage "DM," using mercury, was connected across the regulator having taps one diameter upstream and approximately three diameters downstream. Tests were made initially and no apparent discrepancy in readings occurred, when the downstream taps were made one pipe diameter or three pipe diameters downstream. All taps were made with extreme care to insure against dynamic pressure influencing the static pressure readings.

The volume measurement was accomplished by the stand-

**TABLE 1. 6-IN. OLD STYLE REGULATOR WINGED VALVES—4 17/64 DIAMETER**

| h | $P_M$ | $H_R$ | L | Q | K | A | |
|---|---|---|---|---|---|---|---|
| *Meter Differential Ins. Water* | *Abs. Press. at Meter Psi* | *Differential Across Regulator Ins. Water* | *Vertical Valve Opening Inches* | *Flow Rate in cu ft per hr at 14.65 Base for .6 Gr. Gas* | *Regulator Coefficient in* $Q=K\sqrt{P_o(P_1-P_o)}$ | *Exposed Valve Area* | $\frac{K}{A}$ |
| 28.00 | 54.4 | 19.5 | 19/32 | 79,600 | 12,900 | 15.94 | 810 |
| 28.5 | 54.4 | 16.5 | 5/8 | 80,200 | 14,100 | 16.74 | 844 |
| 32.5 | 54.4 | 11.4 | 3/4 | 85,900 | 18,200 | 20.10 | 906 |
| 35.0 | 54.4 | 8.4 | 7/8 | 89,000 | 22,000 | 23.45 | 940 |
| 36. | 54.4 | 7.6 | 15/16 | 90,400 | 23,200 | 25.10 | 925 |
| 55. | 52.8 | 10. | 1 | 110,000 | 25,200 | 26.8 | 941 |
| 91.5 | 52.7 | 17.1 | 1 | 141,800 | 24,900 | 26.8 | 930 |
| 71.5 | 52.7 | 13.4 | 1 | 125,000 | 24,900 | 26.8 | 930 |
| 61.2 | 52.7 | 11.4 | 1 | 116,000 | 24,900 | 26.8 | 930 |
| 52. | 52.7 | 9.8 | 1 | 107,000 | 24,800 | 26.8 | 927 |
| 42.3 | 52.8 | 7.7 | 1 | 96,000 | 25,000 | 26.8 | 935 |

**TABLE 2. 6-IN. NEW STYLE—TYPE 44 REGULATOR—CENTER GUIDED—4¼ DIAMETER**

| h | $P_M$ | $H_R$ | L | Q | K | A | $\frac{K}{A}$ |
|---|---|---|---|---|---|---|---|
| 28.3 | 54.7 | 17.2 | 3/4 | 124,400 | 21,400 | 20.05 | 1069 |
| 29.0 | 54.9 | 14.4 | 13/16 | 126,400 | 23,700 | 21.80 | 1090 |
| 29.5 | 54.9 | 13.3 | 7/8 | 127,900 | 25,000 | 23.40 | 1118 |
| 33.0 | 54.4 | 11.6 | 1 | 134,500 | 28,300 | 26.70 | 1060 |
| 12.8 | 55.9 | 4.2 | 1 1/16 | 85,200 | 29,400 | 28.40 | 1038 |
| 31. | 55.9 | 10.1 | 1 1/16 | 132,000 | 29,400 | 28.40 | 1038 |
| 12. | 55.4 | 4.1 | 1 1/16 | 82,000 | 28,700 | 28.40 | 1010 |
| 26. | 55.4 | 8.6 | 1 1/16 | 120,800 | 29,200 | 28.40 | 1030 |
| 31. | 55.4 | 10.2 | 1 1/16 | 132,000 | 29,300 | 28.40 | 1032 |
| 62. | 54.4 | 20.2 | 1 1/16 | 184,000 | 29,200 | 28.40 | 1030 |
| 44.5 | 54.4 | 14.2 | 1 1/16 | 156,000 | 29,600 | 28.40 | 1042 |
| 12.8 | 55.9 | 3.8 | 1 3/16 | 84,800 | 31,400 | 31.60 | 995 |
| 31.0 | 55.9 | 8.9 | 1 3/16 | 132,000 | 31,200 | 31.60 | 990 |

ard orifice meter settings in the line. These meters were installed in exact accordance with the AGA-ASME requirements and gave accurate flow readings.

In running the tests on the various size regulators, the flow rate could be varied by switching portions of the load from one run to the other. The meter differential and static pressure were noted, as was the pressure loss across the regulators. The regulators were arranged so that the valve could be set at different openings from closed to wide open. On the 6-in. size, tests were also run on two types of valves—i.e., one set with wing guides (guided from the inside of the cylindrical passages of the valve) and one set with center guides (guided on the valve stem at points above the top valve and below the lower valves).

## Coefficient "K" Computed

Tests were also run on the 6-in. size on two body designs, without valves in the regulators so as to measure the orifice characteristics of the regulator body alone.

The determination of the regulator coefficient "K" could be computed for the three sizes of regulators involved, based on the data of the test. Also from the observed results a relation between K and the exposed valves flow area was determined so that K for any size valve could be computed. The exposed valve flow area "A" is defined as the two cylindrical areas formed as the valves are raised from their seats, the base of each cylinder being the valve seat circumference and the height being the valve stroke. If we denote the valve seat diameter as D, and the lift as L, the exposed valve area A of the double valves is given by this formula

$$A = 2\pi D L$$

There is some evidence from the data of these tests, and also by area calculations, that the flow capacity of the regulator reaches a practical maximum when the valve lift is approximately one-quarter of the valve diameter. The diaphragm material and construction often impose a limitation on valve stroke which prevents using a lift of more than a relatively small portion of the valve diameter. If we use one-quarter of the valve diameter as permissible valve lift, our formula for exposed valve area becomes

$$2\pi D \times D/4 = 1.5708 D^2$$

In fact, as we will see later there are in weight loaded, lever or weight loaded, and spring loaded regulators (as against pilot loaded or instrument loaded designs) serious valve stroke limitations due to the necessary diaphragm material thickness. In these designs the full outlet pressure is applied to one side and only atmospheric pressure to the opposite side; hence the material must be heavy enough to withstand this load. It is sometimes difficult to arrange this type of heavy material to give long valve strokes.

The relation between flow capacity, valve opening, coefficient, and exposed area for the four regulators used in the test is shown in *Tables 1, 2, 3, and 4.*

The above tests were run on these representative sizes of regulators, the 6-, 8- and 10-in. In the 6-in. size two regulators were used, an old style with wing guides and a new style No. 44 with center guides. In order to equalize as nearly as possible the comparison between these two types,

a test was run on the two types with the valves removed from the regulator. It was found that the coefficients under these conditions were almost the same, the old regulator having a coefficient K of 39,600 and the new regulator a coefficient of 38,500.

However, with the valves in, the regulators showed an increased capacity for the center guided valves over the wing guided. When the factor K/A, was determined it will be noted from *Table 1* for the wing guided valve that the value averaged about 930. From *Table 2* the results at the recommended opening D/4 = 4.25/4 = 1-1/16-in. for the center guided valve, averaged about 1030. On this basis, it should be safe to assume that wing guided valves have roughly 10% less capacity than the center guided valves of the same diameter.

It will also be noted in reviewing the values of K/A in *Tables 1, 2, 3, and 4* that the values, when the regulator approaches its maximum permissible opening of D/4, for the larger sizes increase to an average value of approximately 1130 for wing guided valves. This is probably due to less relative restriction due to the stem and wings on the larger sizes. The K/A factor for center guided valves would be approximately 1200 in these larger sizes.

In order to generalize the result based on these representative tests, it is proposed that for wing guided valves for 6 in. and below to use a K/A factor of 900, and over 6 in. a K/A value of 1000. The center guided valves 6 in. and below will have a K/A factor of 1000 and above 6 in. a factor of 1150. This is a conservative figure, based on the above tests. *Table 5* shows the factor K for Chaplin-Fulton regulators based on the above values.

It is felt that in the absence of extreme design features the above K/A factors can be used for any wing guided or center guided regulator. It is only necessary to know the diameter of the valves, and to apply the following factors:

For regulators below 8 in. in size, wing guided—K = 900A.
For regulators below 8 in. in size, center guided—K = 1000 A.
For regulators, 8 in. and above, wing guided—K = 1000 A.
For regulators, 8 in. and above, center guided—K = 1150 A.

The selection of regulator size for a gas pressure reduction stage, should be made carefully if the full efficiency of the equipment is to be realized. Good economics dictates that the regulator be as small as possible to keep to a minimum both the initial cost of the regulator, and of the pit, vault, or house that is to enclose the installation.

Also from the point of view of performance the regulator size should be kept as small as possible, since most installations have a large ratio between the maximum and minimum flows. If a regulator is called upon to control at flow rates which are too small, pulsation, buildup in outlet pressure, and erratic control may result. Hence, oversize regulators will give poor low flow performance.

**TABLE 3. 8-IN. OLD STYLE REGULATOR—WITH WING GUIDES—4⅞ DIAMETER VALVES**

| h | $P_M$ | $H_R$ | L | Q | K | A | K/A |
|---|---|---|---|---|---|---|---|
| 29.5 | 54.2 | 18.3 | 3/8 | 66,000 | 11,000 | 11.50 | 957 |
| 36.2 | 53.7 | 10.4 | 1/2 | 72,500 | 16,150 | 15.35 | 1050 |
| 40. | 53.4 | 7.1 | 5/8 | 76,000 | 20,550 | 19.15 | 1072 |
| 41. | 53.9 | 4.27 | 3/4 | 77,500 | 26,950 | 23.00 | 1170 |
| 41. | 53.4 | 3.19 | 7/8 | 77,400 | 31,300 | 26.80 | 1170 |
| 23. | 52.4 | 1.4 | 1 | 57,200 | 35,200 | 30.65 | 1145 |
| 45.5 | 52.4 | 2.75 | 1 | 80,500 | 35,300 | 30.65 | 1150 |
| 58. | 52.4 | 3.4 | 1 | 90,600 | 35,800 | 30.65 | 1168 |
| 71.5 | 52.4 | 4.35 | 1 | 101,000 | 35,200 | 30.65 | 1145 |
| 78. | 52.4 | 4.6 | 1 | 105,500 | 35,700 | 30.65 | 1163 |
| 96.2 | 52.4 | 5.8 | 1 | 117,000 | 35,300 | 30.65 | 1150 |

**TABLE 4. OLD STYLE REGULATOR—WITH WING GUIDES—7¼ VALVE DIAMETER**

| h | $P_M$ | $H_R$ | L | Q | K | A | K/A |
|---|---|---|---|---|---|---|---|
| 15. | 54.6 | 15.8 | 9/16 | 80,800 | 14,500 | 26.50 | 567 |
| 18.5 | 54.4 | 10.4 | 5/8 | 89,600 | 19,800 | 28.50 | 695 |
| 41.5 | 50.4 | 15.1 | 11/16 | 129,000 | 24,600 | 31.40 | 785 |
| 21.0 | 54.4 | 5.4 | 3/4 | 95,500 | 29,200 | 34.20 | 855 |
| 42.00 | 50.4 | 11.8 | 3/4 | 129,800 | 29,200 | 34.20 | 855 |
| 44.7 | 50.4 | 7.5 | 7/8 | 134,500 | 36,200 | 39.95 | 916 |
| 13.5 | 55.4 | 2.4 | 7/8 | 77,100 | 35,200 | 39.95 | 882 |
| 26.3 | 55.4 | 4.6 | 7/8 | 107,500 | 35,200 | 39.95 | 882 |
| 35.3 | 55.4 | 6.2 | 7/8 | 124,900 | 35,400 | 39.95 | 887 |
| 56.0 | 54.6 | 9.8 | 7/8 | 156,000 | 35,400 | 39.95 | 887 |
| 76.0 | 54.4 | 13.2 | 7/8 | 181,500 | 35,700 | 39.95 | 895 |
| 100. | 54.0 | 17.3 | 7/8 | 207,500 | 35,900 | 39.95 | 900 |
| 43. | 50.4 | 7.2 | 7/8 | 131,000 | 36,200 | 39.95 | 916 |
| 44. | 50.4 | 4.5 | 1 | 132,500 | 46,100 | 46.50 | 1010 |
| 45. | 50.4 | 3.2 | 1 1/8 | 134,200 | 55,600 | 51.30 | 1085 |
| 45.3 | 50.4 | 2.5 | 1 1/4 | 134,600 | 63,000 | 57.00 | 1105 |
| 46. | 50.4 | 2.00 | 1 3/8 | 136,000 | 71,400 | 62.60 | 1140 |
| 46. | 50.4 | 1.7 | 1 1/2 | 136,000 | 77,200 | 68.50 | 1130 |
| 45.2 | 50.4 | 1.4 | 1 3/8 | 134,200 | 84,100 | 74.00 | 1140 |
| 45.7 | 50.4 | 1.2 | 1 3/4 | 135,200 | 91,400 | 79.70 | 1142 |
| 46.0 | 50.4 | 1.2 | 1 7/8 | 136,000 | 92,000 | 85.50 | 1080 |

**TABLE 5. FACTOR K**

| Size Regulator | Valve Diameter D | Exposed Valve Area - $1.57D^2$ | K |
|---|---|---|---|
| 2 | 1¾ | 4.81 | 4810 |
| 3 | 2⅛ | 7.10 | 7100 |
| 4 | 3 | 14.14 | 14,140 |
| 6 | 4¼ | 28.4 | 28,400 |
| 8 | 5¾ | 51.95 | 59,600 |
| 10 | 7⅛ | 79.7 | 91,800 |
| 12 | 8½ | 113.2 | 130,000 |

Quite often it is impossible to estimate the eventual maximum load, which results in a tendency to select too large a regulator. Also the conservative nature of many engineers will lead to oversize installations. Fortunately most manufacturers of regulators have arranged their designs so that a regulator of any nominal size can be equipped with valves of one and two sizes smaller, hence permitting the initial installation of a large regulator for eventual loads, using smaller valves for the immediate condition. Since the control accuracy is mainly dependent on the valves, substitution of smaller valves will insure good control even if the nominal size regulator is too large.

In selecting a regulator, as accurate a value as possible should be obtained for the maximum flow rate, the minimum inlet pressure and the maximum required outlet pressure. It is also necessary to know the degree of accuracy to which the outlet pressure must be held, for as will be developed later, this has an important effect on the regulator capacity.

There are several methods of outlet pressure control that can be used, the choice of which is usually dependent on the accuracy required. Pilot loaded regulators, in which an especially designed small pilot regulator imposes a controlled pressure on a relatively large diaphragm, will give a very high accuracy in outlet control. *Fig. 2* shows such a system. Since the diaphragm which moves the main valves is subjected to a relatively small pressure difference across it, it can be of flexible material, have a minimum of resistance to movement, and thus contribute to accurate control. Also the loading pressure, $P^L$, is varied so as to maintain constant the outlet pressure $P^o$, which is the pressure applied to the diaphragm of the control regulator. This type of pressure control has the ability to move the valves from their minimum to their maximum operating position without an appreciable variation in outlet pressure. Hence when this type of control is used, the capacity formulae and tables can be applied without any modification. The full value of the flow rates, as given by those formulae for every condition of inlet and outlet pressure, can be used directly.

## Instrument Type Controls

The same reasoning can be applied to the so-called instrument type control, *Fig. 3*, in which a special diaphragm and spring arrangement controls outlet pressure by positioning the valves. The loading of the diaphragm with pressure is controlled by an instrument type element—such as Bourdon tube or metallic diaphragm. Here the outlet pressure is kept at a constant value, no matter what the main valve position, until the opening has reached its maximum. The full value of the capacity table, therefore, can be used without modification.

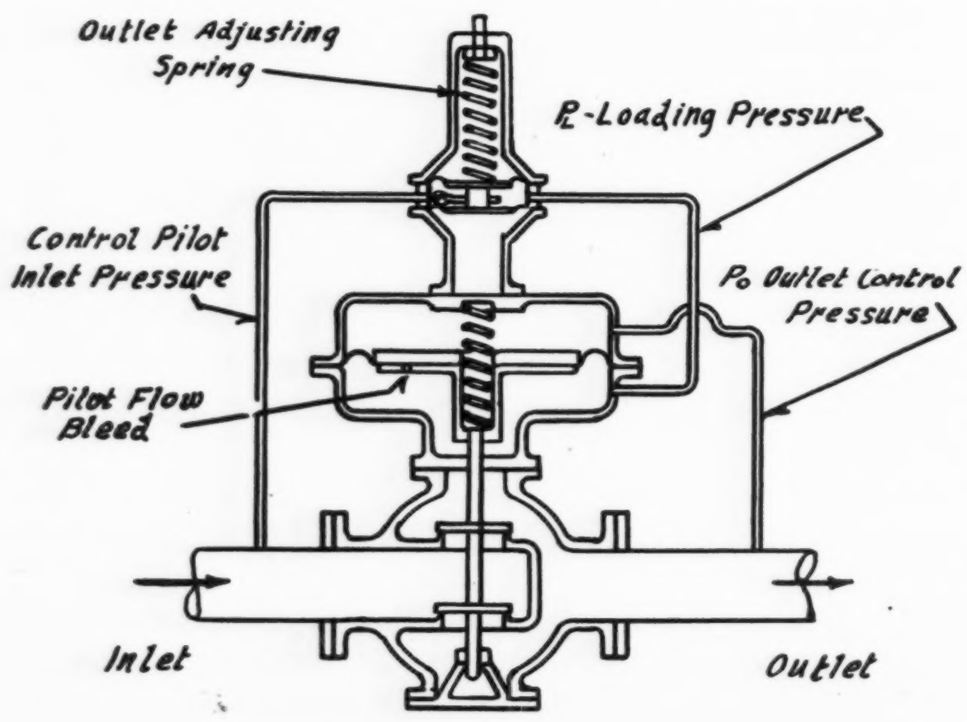
For many years, weights directly applied to a diaphragm, or a lever and weight system bearing on a diaphragm have been used in pressure regulation. The lever and weight system, particularly, has found wide application because of its extreme simplicity and ruggedness. *Fig. 4* is a typical example of this system. Since the diaphragm must resist the full outlet pressure on one side, and only atmospheric pressure on the other, the material in the diaphragm sheet must be relatively heavy and for the higher pressure range lacks complete flexibility. If it is made from flat sheeting, it must be "gathered" at the outer clamping flanges, to permit sufficient valve stroke. In some designs, the material is molded to help acquire the arch which permits movement.

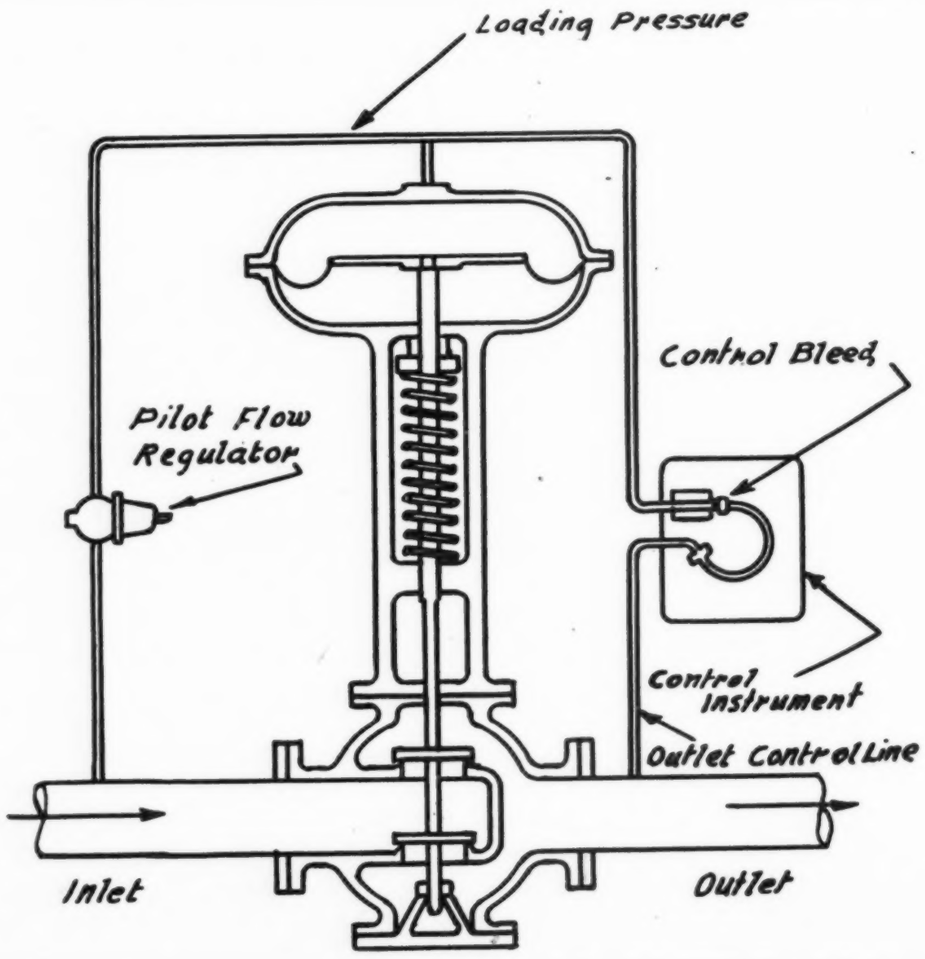
The actual diaphragm area which is effective in reacting against the force of the weight and lever presents a peculiar phenomenon in that it is not a constant as sometimes supposed, but is a variable, depending in part on the relative position of the outer stationary clamping flanges and the inner moving diaphragm pans. *Fig. 5* illustrates this point. In the left drawing the valves are in a downward (or nearly closed) position, corresponding with low flow through the regulator. In the right drawing, the valves are in the upper (or open) position corresponding with a large flow.

The outlet pressure acting on top of the diaphragm, in influencing the shape taken by the free parts of the diaphragm material, acts normal to the material. In other words, the actual shape taken by the free diaphragm mate-

**Fig. 2 (below). Pilot loading regulator.**

**Fig. 3 (at right). Instrument controlled regulator.**



rial is a function of the diameter of the fixed flanges $D^F$, and the flexibility of the diaphragm material. When the moveable diaphragm pan is below the fixed diaphragm case flanges, (for downward closing valves) the shape taken by the free part of the diaphragm will be such that the crown will have a diameter $D^c$. The free diaphragm area will have a pressure acting normal—i.e., at right angle to—its curve along the entire area. However, the pressure acting on the diaphragm outside the diameter $D^c$, will only contribute in its vertical component to tensile strain in the diaphragm material. However, the vertical components of the pressure acting inside the diameter $D^c$ contribute to counteracting the force on the diaphragm caused by the lever and weight. Thus the downward force is $P^o\ (D^c/2)^2\pi$.

When the valve has opened to take care of the large flow rates, the diaphragm shape is similar to that shown on the right side of *Fig. 5*. Here because of the relative diameters $D^F$, and $D^M$, and the fact that the moving diaphragm pan is above the fixed diaphragm outer diameter, the free part of the diaphragm will take a somewhat different shape, and the effective diameter will be $D^o$. Because of the geometric considerations as shown, $D^o$ is actually larger than $D^c$; this is confirmed by the test curves shown in *Figs. 5, 7, and 8* which will be discussed later. Here again, the pressure on the top of the diaphragm will act normal to its surface, the vertical components of those forces acting outside of diameter $D^o$, will only result in tension in the diaphragm material. The vertical components of the pressure acting inside the diameter $D^o$ will counteract the force of the lever and weight system. Between the valve closed and the valve open position, the area of the diaphragm which is effective in counteracting the force increases from $(D^c/2)^2\ \pi$ to $(D^o/2)^2\ \pi$. Since the upward force of the lever and weight system remains practically constant, the required pressure

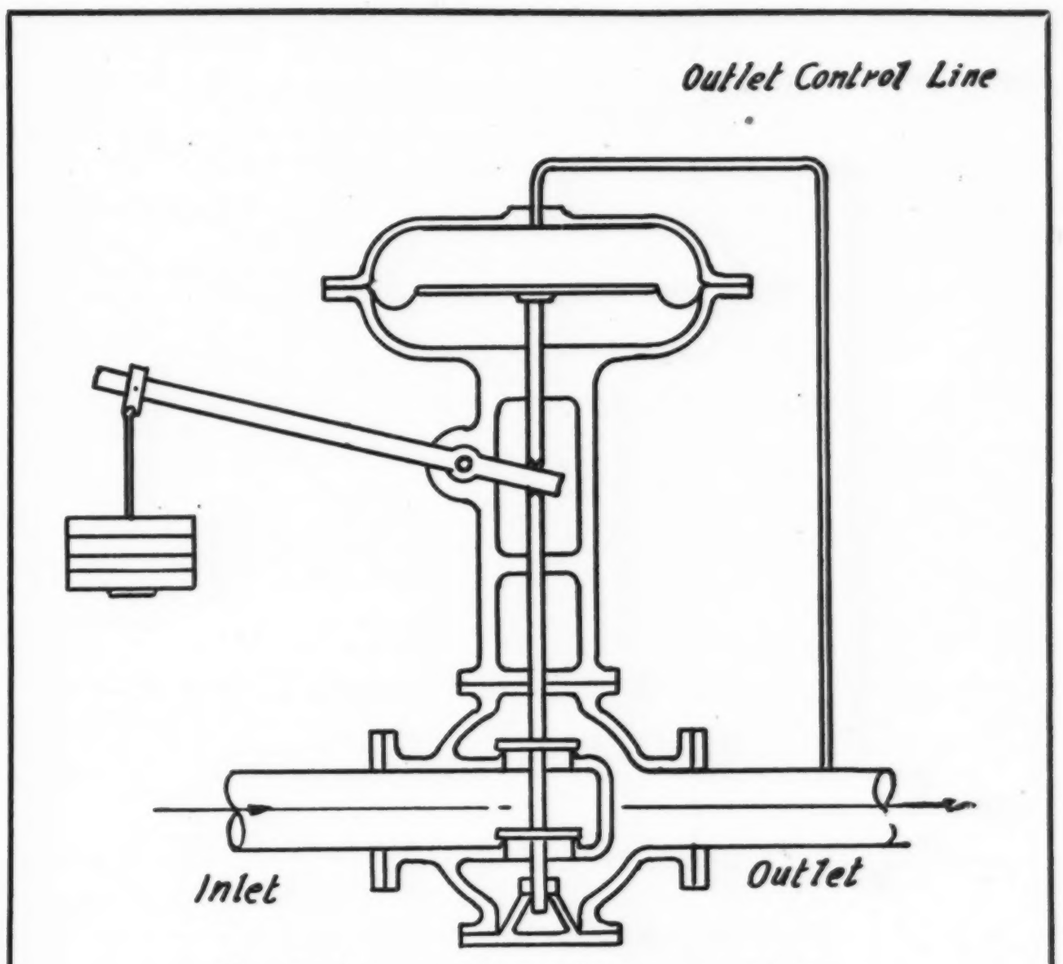



**Fig. 4. Lever and weight type regulator.**

on the larger area $(D^o/2)^2\ \pi$ will be less than the smaller area $(D^c/2)^2\ \pi$ in counteracting the constant lever and weight force. Hence as the valves open to take care of larger flows, the outlet pressure will decrease.

The quantitative value of this decrease in outlet pressure is shown in the curves in *Figs. 6, 7 or 8*. In running the tests from which these curves were plotted, the pressure was applied to the top of the diaphragm and accurately measured with a pressure gage. Enough pressure was applied to

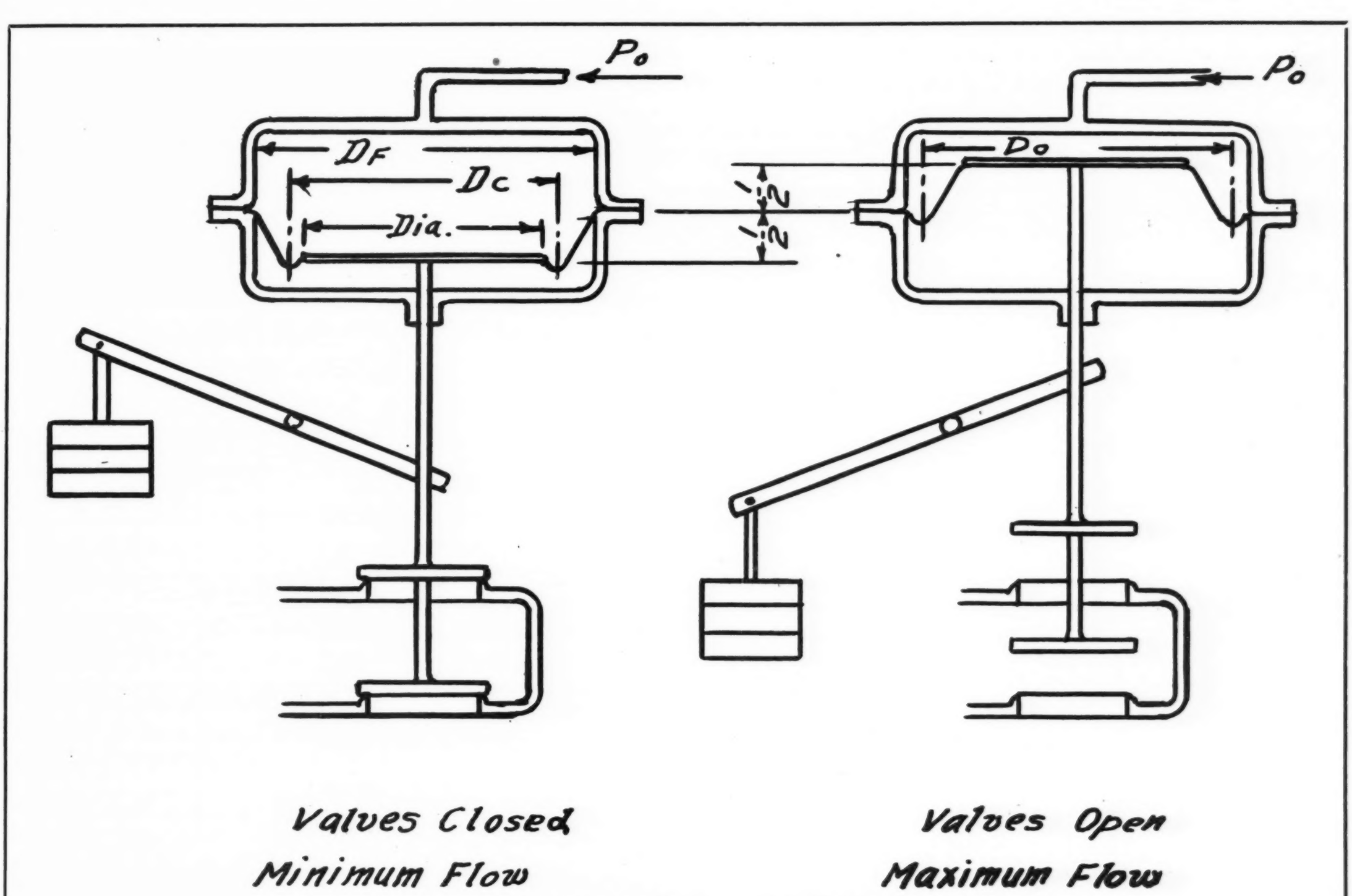



**Fig. 5. Variation in effective area of diaphragm.**

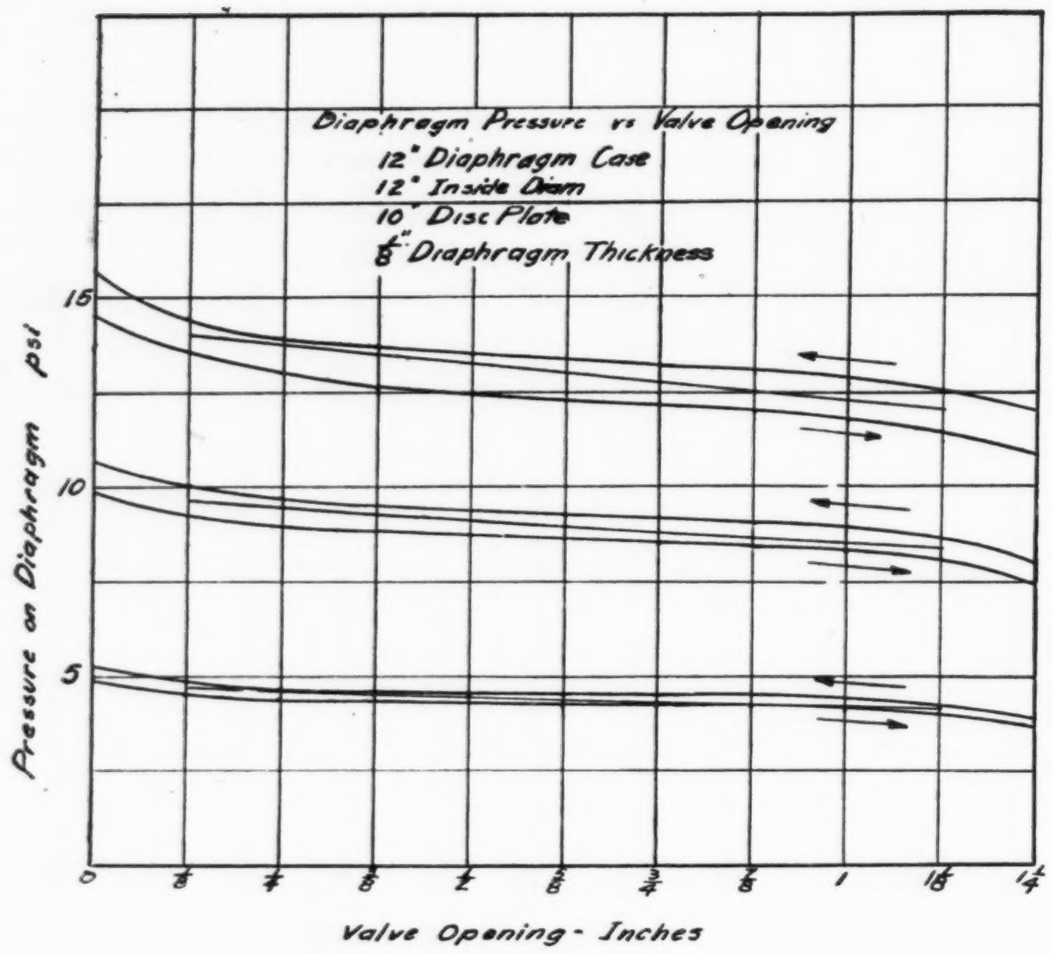



**Fig. 6.**

completely close the valve against the loading of the lever and weight. A scale was arranged so that the actual valve movement from closed to wide open could be measured accurately. Pressure was released to allow the valve to move toward the open position and the relation between balancing pressure and valve position noted. When the diaphragm had moved distance corresponding to the maximum valve stroke, the pressure on the diaphragm was increased and the valve started to move toward the closed position. Again as the pressure was increased the pressure and valve position were noted.

In any mechanical system in which there is movement, friction is present, and is a force that must be overcome by outside means. In moving from the open to the closed position (from the right of curves 6, 7 and 8) the pressure must be increased to take care of the decreasing effective diaphragm area, and also to overcome the friction in the bearings of the lever system and stuffing box friction, which acts upward, since the parts are moving downward. When the valves are moved from the closed to the open position (left to right on the curve) the pressure must be decreased bcause of increasing effective area. However, in this case since the motion is upward, the frictional force acts downward in the same direction as the pressure, thus tending to aid it. The pressure then for this opening motion, at any one point is less than for the same position in closing the valves. This explains the spread between the pressures in moving the valves in opposite directions. The arrows next to the curves give the direction of valve motion during the tests. Obviously, the greater the friction the greater the spread between the up and down curve.

The important point to notice in the curves is that the pressure required to balance the lever and weight system goes down as the valve opens which means practically that when operating a regulator, the outlet pressure decreases as the valves open with increased flow rate. The average amount of the decrease is shown by the straight line interposed between the two curves.

It will be noted that the smaller the head, the steeper the slope of the outlet pressure-valve position curve. For any one head also, the more the loading to obtain higher outlet pressures, the greater the curve-slope, hence the greater the actual pressure fall-off. For any one size of diaphragm head, the ratio of pressure fall-off to initial pressure-loading tends to remain constant.

In actual regulator control work, this fall-off in outlet pressure with increasing volume is a well known factor; its exact magnitude, however, is often not known. The curves given here are a direct quantitative representation of this value and will predict quite accurately the expected performance.

The fall-off is an important consideration in selecting regulators for capacity. If a lever and weight type is to be used, it must be recognized that the fall-off is present. If the full value of the fall-off can be tolerated and the outlet pressure setting made to allow for it, then the full values of the capacity table can be used. Thus if an outlet pressure of 25 psi is desired but this can be allowed to drop to 20 psi, out curve for the 7-in. case, *Fig. 7*, shows this can be used with a regulator having a maximum valve stroke of 1⅛ in., the approximate stroke of a 6-in. regulator. The capacities will be the full value of the capacity table.

If, however, only a 3-lb fall-off can be tolerated the curve shown the stroke must be limited to ¾ in.; and since the

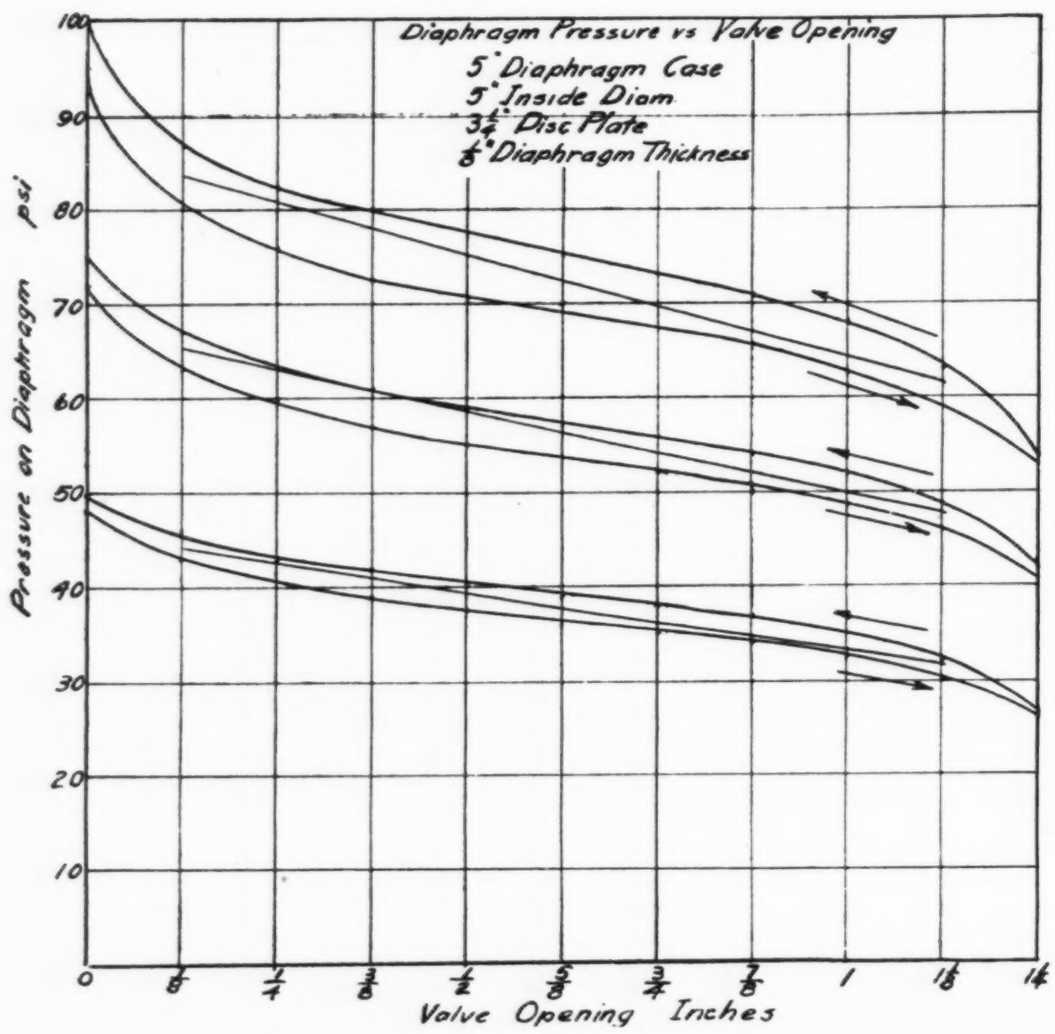



**Fig. 7.**

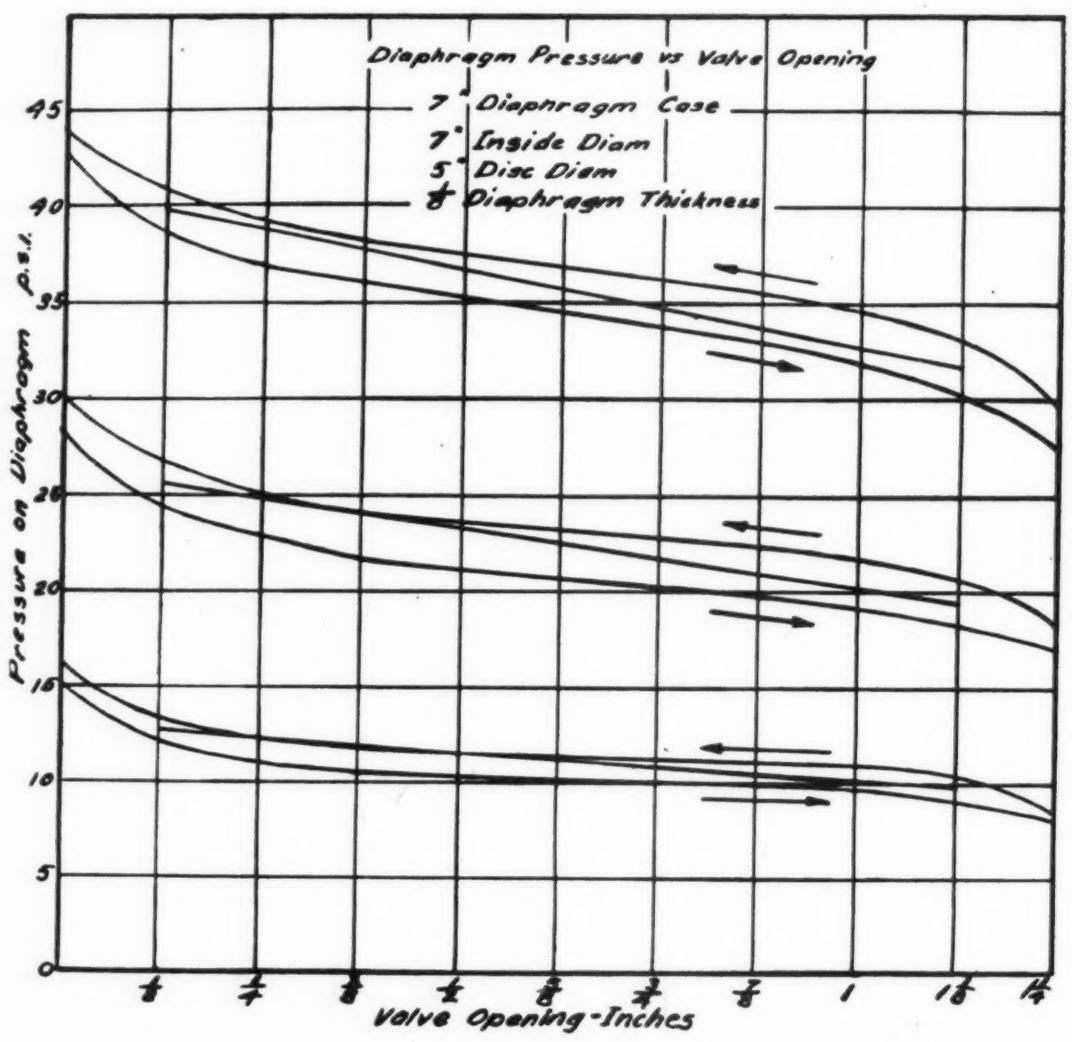



**Fig. 8.**

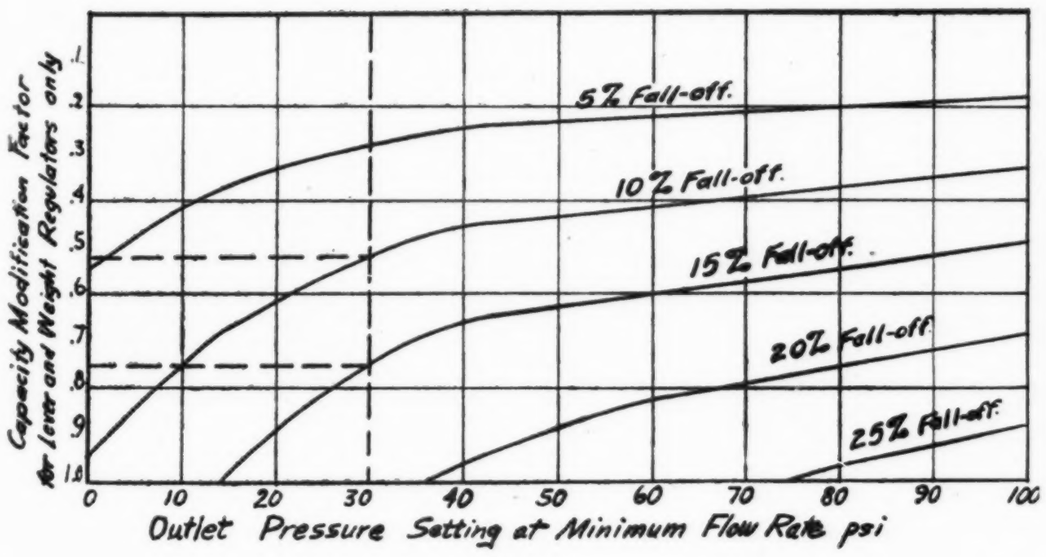



**Fig. 9.**

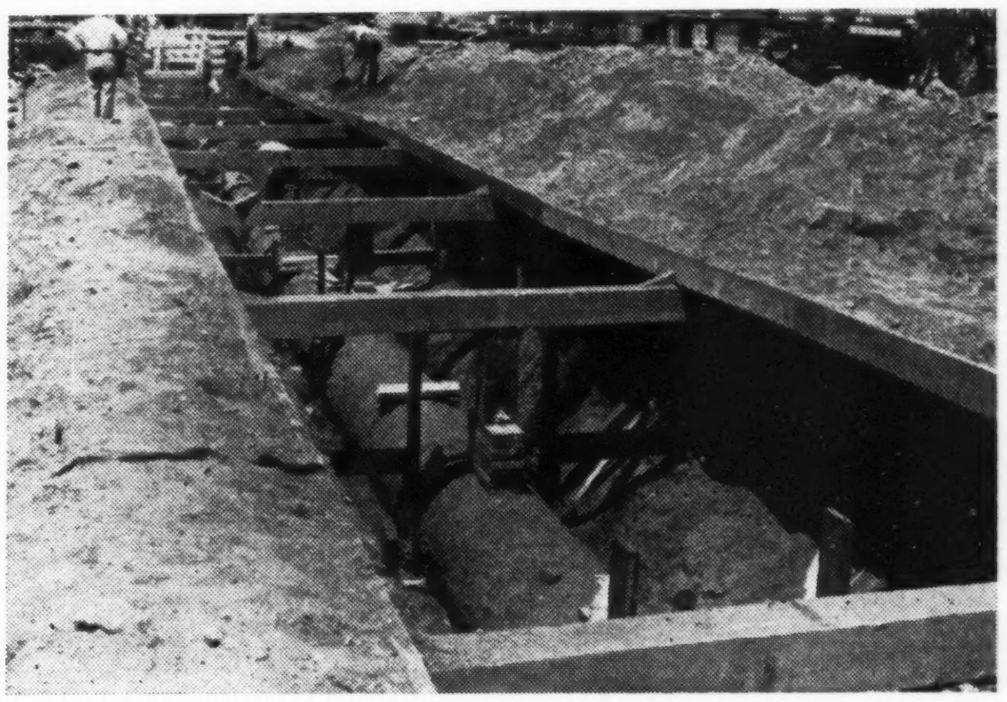
capacity, except at very low flows, is approximately proportional to the valve lift, the capacity as determined from the table or formulae should be modified by the factor $\frac{3}{4} \div 1\frac{1}{8} = .665$.

By using the values of *Figs. 6, 7, and 8* it is possible to plot the curve shown in *Fig. 9*. In using this curve, after selecting the outlet pressure, an allowable fall-off expressed in percentage of this outlet pressure, must be decided upon. Then using the curve in *Fig. 9*, the intersection of this outlet pressure with the percentage curve selected is determined; the factor by which to multiply the capacity as shown in the table is obtained by dropping directly down to the horizontal scale. This value we call the Capacity Modification Factor, and it must be multiplied into the table capacities to obtain the true capacity under the prescribed conditions.

It can be seen from this curve that for a lever and weight loaded regulator, the smaller the permissible fall-off in outlet pressure, the smaller the modification factor, and hence the smaller the capacity of the regulator.

An example follows: Desired outlet pressure = 30 psi; permissible fall-off = 2 psi or 10% of 30. On *Fig. 9* we have drawn a horizontal line corresponding to 30 psi outlet pressure on the ordinate scale, until it intersects the 10% line. Dropping down to the abscissa scale, we find the modification factor .52. Any capacity selected from the tables must be multiplied by .52 to obtain the true capacity. If we were to allow a fall-off of 6 psi or 20%, by following our 30 psi outlet pressure line horizontally to the right, we find that it intersects the full capacity line before the 20% line and the full capacity as shown by the table or determined by the formula can be used. If the permissible fall-off were 15%, or 4.5 psi, the modification factor would be .75.

The curve in *Fig. 9* gives us, then, a means of selecting weight and lever type regulators for their capacity with due regard to the performance expected. Spring loaded regulators, in those cases the outlet pressure range can be attained by a spring, will have a fall-off in excess of those shown in *Figs. 6, 7, and 8*, for in addition to the variation in effective area of the diaphragm, we have the decrease in spring pressure as the valve moves from the closed to the open position, requiring less outlet pressure to balance the spring force in the open or high flow position of the valves. It should be noted, however, that in most pilot loaded regulators, and those controlled by instruments, there is no requirement for a capacity modification factor; there is no outlet pressure fall-off, and the full capacity of the tables can be used. It is of course necessary to see that the valves, if they are of the simple wing-guided or center guided type, are arranged so that they can open to at least one-quarter of their diameter. Characterized, Vee-port, or other special types of valves, will require strokes greater than one-quarter of their diameter to attain their fullest capacity.



# Cast Iron Main Lowered 19 In. - - Time Elapsed: Six Hours

IT took Brooklyn Union Gas Co.'s distribution department just 6 hours, 10 minutes this summer to lower a 444-ft section of 30-in. cast iron main 19½ in.—and it was done without interrupting service, disconnecting the main, or opening a single leak in the cast iron bell-and-spigot joints.

Of course, considerable preparation was required for the job, excavation getting under way June 29 and actual lowering taking place July 14.

The problem was to clear the way in the service road of the Van Wyck Expressway north and south of 95th avenue, where the traffic artery, under construction at the time, is being depressed to provide better drainage.

After the first excavations had been made, a bridge of 1-in. steel plates was laid over heavy bracing across the juncture of the line with 95th avenue to permit uninterrupted passage of traffic.

*Brooklyn Union Gas News* tells the story of how the job was performed:

> The excavation was spanned at intervals of 15 ft with 8 x 8 timbers which extended 4 ft on each side of the trench. Two-inch planks were then laid on these timbers, forming a 4-ft boardwalk on either side of the trench. Tons of dirt from the excavation were placed on the planking to add weight. Blocking was then used from the underside of each 8 x 8 timber to the top of the main. These precautions were necessary to guard against the possibility of having the main rise in case a heavy rainfall filled the trench with water. A minimum of 52 lb per running foot of 30-in. pipe is required to prevent the pipe from floating.
>
> The excavation which exposed the entire length of the main down to its base was 455 ft long and 9 ft wide. At 15-ft intervals, careful additional digging was done to permit the insertion under the main of 1-in. boards equivalent in depth to the number of inches the main was to be lowered at that particular point.
>
> When the entire length of main had been prepared in this manner, it was merely necessary to remove a single 1-in. board at a time, transferring it from beneath the main to the top of the main, thus gradually lowering the main into its new bed.
>
> The entire main, with the exception of the low center point, now 19½ in. below its former position, was then backfilled with sand by flushing.

# Adaptation ina

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By CHARLES M. RUT

**FRONT VIEW of Pittsburgh Equitable's "traveling corrosion laboratory," with author alongside. Note partition for tools, meters, and other testing equipment.**

THERE are three types of corrosion: electrolytic corrosion, galvanic corrosion, and bio-chemical corrosion.

*Exclusive*

The first of these, electrolytic corrosion, is commonly referred to as "electrolysis" and is caused by stray currents lost from sources of direct current generation.

Most electric railway systems, both surface and underground, use their metallic tracks as the conductor for returning the operating current back to its point of origin. Underground metallic structures, such as pipelines, will provide a secondary path for the return of this current, particularly if they lie near and parallel to the tracks.

In its return to the substation from which it originated, these currents will follow the best conductors available, and the efficiency of pipelines in acting as conductors for these stray currents determines the possibility and extent of electrolytic corrosion or damage to the lines.

A pipeline which is a good conductor will suffer less from electrolytic corrosion than one which is a poor conductor, for corrosion takes place on these pipes at the points where the current tends to leave the pipe to re-enter the soil. These points of possible corrosion are usually created by the high resistance to current flow at the pipe joints.

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The author is corrosion engineer, Equitable Gas Co., Pittsburgh. He is a member of the Pittsburgh Corrosion Committee and the National Assn. of Corrosion Engineers. A part of this article first appeared in *Public Service*, employee publication of The Philadelphia Co. and subsidiaries, in February. It has been expanded for *GAS'* exclusive use.

In controlling electrolytic corrosion, Equitable Gas Co. of Pittsburgh is attempting to make its lines better current conductors, so as to take full advantage of the electrolysis drainage system provided by Pittsburgh Railways.

In the city of Pittsburgh, as in numerous other cities, electrolysis or stray current drainage cables have been installed and in use for a number of years. The location and extent of these cables are governed by the locations of the various direct current power stations converting current for the street railways system. The street railways system in Pittsburgh, being a grounded rail system, introduces various conditions creating certain stray current corrosion problems.

## Company Responsibility

Since the established current drainage cables are located only along certain parts of the railways system, it is then the problem of the companies owning underground pipes or cables to be able to conduct the stray currents collected by their structures to the various current drainage connections.

In the past years most pipe-owning companies had installed lines without any thought that these lines might also be called upon to act as possible electrical conductors, returning stray direct currents to their sources of generation. Some of the original lines were installed at a time when the street railways systems were not as extensive as they are today. The extending of the rail system and the increase in the number of cars in operation have, of course, increased the power needed to operate the system. Any change in the power generated will of course affect the electrolytic conditions of the various underground structures. Whether these changing conditions affect the underground structures favorably or not can only be determined by continuing periodic surveys and investigations.

## No Measures Taken

Most of the original pipelines had been installed without measures being taken to make them efficient current conductors; therefore these lines have been found to be either poor conductors or non-conductors of stray direct currents. The poor conductivity of the lines is due to the resistance to current flow at the pipe couplings. The various types of pipe couplings will create different degrees of resistance and it will be found that electrolytic corrosion is caused at those couplings where high resistance is created. The current will leave the pipe at these couplings, and re-enter the earth to flow around the coupling or to some other sub-structure.

The greater number of power stations being located in the urban districts means that the company's distribution lines are the ones to which most of the current drainage cables are attached. In most cases the original lines lay in a continuous path through both the urban and suburban districts and since all areas are possible current collecting areas it can be seen that the pipe structures must be efficient current con-

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ol e Corrosion

*Pittsburgh railway drainage system aids Equitable Gas*

**REAR VIEW of testing truck. Mr. Rutter stands by partitioned racks, largest of which carry bars and rods up to 5 ft long, and large rolls of wire and cables.**

ductors in their entire length. It is imperative, therefore, to eliminate existing high resistance pipe joints and to avoid creating them on any new pipe installations.

Although severe and rapid corrosion can be caused to underground pipe structures in some instances by electrolytic corrosion, the presence of these stray currents in the earth cannot be wholly condemned. The current drainage system, being designed to remove safely current collected by the substructures, will function correctly if the structures are efficient conductors. If the structures are efficient conductors then they will be efficient current collectors. The ability of these underground structures to collect stray currents from the earth will provide them with cathodic protection. The cathodic protection received by the various underground structures in this manner is far greater than the electrolytic corrosion caused by these same stray currents leaving these structures.

## Metal to Metal

Another manner in which direct current is imposed upon certain structures is by the actual metal to metal contact of these structures to each other, either below or above ground. This equalization or transfer of current from one structure to another is a normal condition and in most cases is to be desired. The condition is most predominant between the pipe systems of water and gas companies. If both systems maintain conections to the electrolysis drainage cables and if both systems attempt to make efficient current conductors of their pipe structures, then this current equalization is usually not harmful to either system. The vast pipe network of the water and gas companies' distribution systems provides numerous metallic paths for collecting and conducting stray currents to the drainage cables but, as can be seen, the more efficient conductor of the two systems will be the one that might have unusual large amounts of current imposed.

This current transfer from one of these two systems to the other is accomplished mainly from the service lines of both systems entering numerous buildings where they contact each other through hot water heaters, furnaces, actual pipe to pipe contact, etc. These service lines, therefore, act as bonding wires between the main lines of the two systems and since these service lines are composed of less metal, as compared to the main lines, accelerated corrosion can be caused to some service lines because of this current flow between these lines. This equalization of current is, of course, favorable to the system delivering the current to the other system, whereas the system receiving this current must now be able to conduct safely to the drainage cables the current collected by both systems. It must be realized also that current being transferred from one system to the other in this manner does not provide cathodic protection to either system, since the current is not being collected from the earth. But as stated before, this equalization is desired in most cases as it helps to prevent electrolytic corrosion between the main lines of the two systems.

A highly unsatisfactory condition arises in reference to this current transfer condition when one or more of the systems have actual contact to the rail systems. These contacts to rail are created in a number of ways, either accidental or deliberate. Contacts to rail can be made in the street where the pipe structures, valve boxes, etc., might accidentally contact the rail or the rail bonding system. Various bridges supporting both the rail and pipe structures will transfer rail current through the bridge structure to the pipe system if both the rail and pipe systems are grounded to the bridge structure.

## Lines Draw Current

A recent survey made of various railway car houses has shown current flowing out of these car houses over the gas and water service lines and in some cases over the neutral wires of the a.c. wiring system. These service lines and conduits being in contact with the rail were found to be draining rail current to the main lines in the street in amounts of considerable magnitude.

The proper use of insulating couplings and insulating materials will correct these various unsatisfactory conditions by isolating each system. But if corrective measures are taken it can be seen that the current drainage cables can become overloaded by draining rail current along with stray currents.

Other conditions are constantly changing the efficiency of the current drainage system, such as main line ex-

tensions, new lines in new areas, increased or decreased rail operations and consequent increased or decreased power generation, etc. These changing conditions make necessary a constant check on the existing current drainage system.

The Pittsburgh Railways Co. as a member of the Pittsburgh public service coordination committee is constantly studying recommendations made by other members of the committee in reference to extending or removing certain drainage cables, redesigning the rail resistors established in the power stations, installing new connections to the drainage cables and other problems introduced at the committee meetings.

## Improve Conductivity

Therefore, to take full advantage of the drainage system, the pipeowning companies in Pittsburgh are attempting to improve the conductivity of their lines and to eliminate all rail contacts so as to create a more efficient drainage system.

This discourse has only referred to the direct current used for the operation of the street railway system as the source of stray currents. Other sources of direct current such as that used for underground mining operations will also create the same corrosive conditions if the proper precautions are not taken.

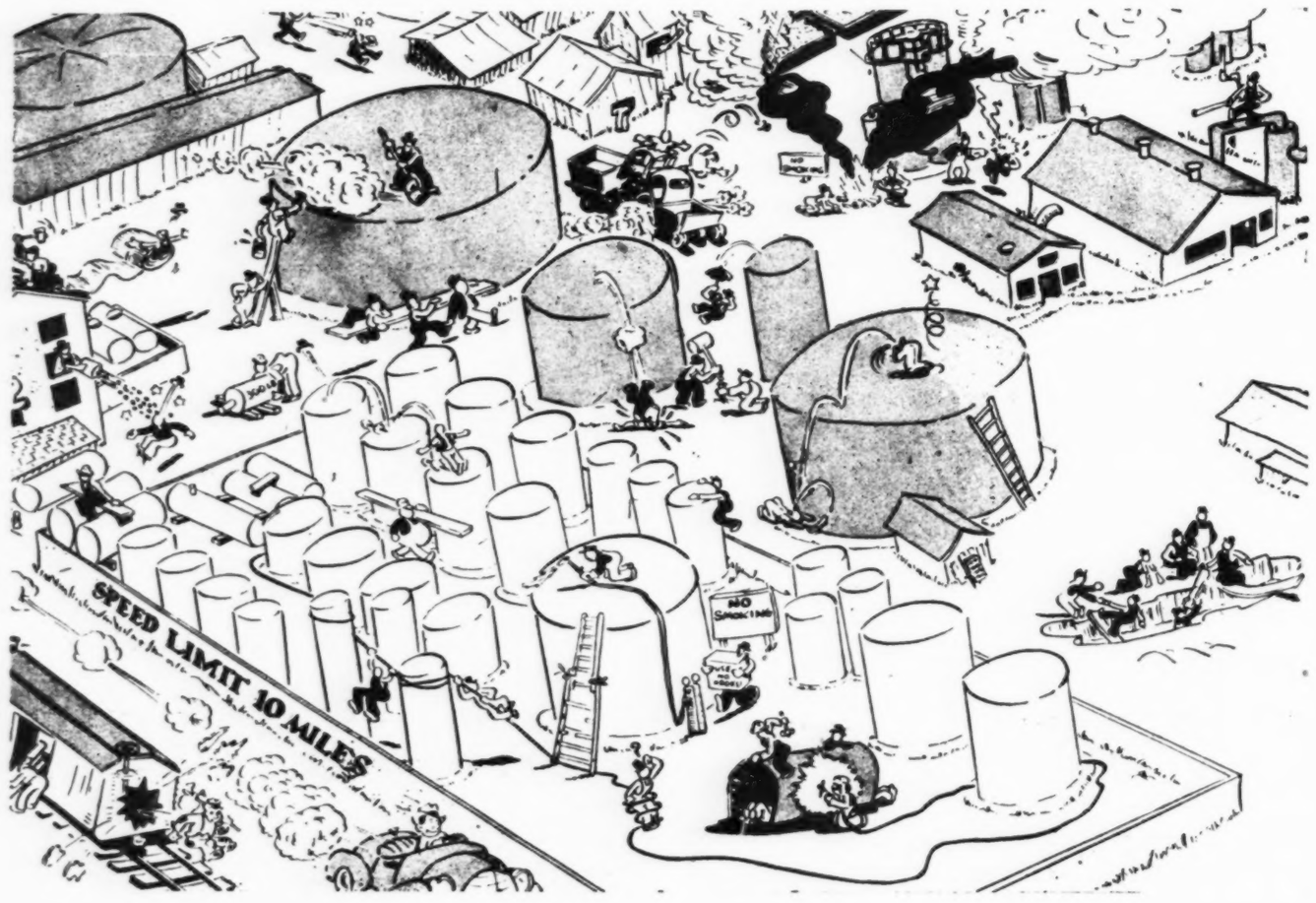
An excellent example of a galvanic cell is the ordinary dry cell battery. Here, the zinc case combining with the chemicals of the electrolyte paste causes electrical energy to flow through the electrolyte to the carbon pole. This electro-chemical action causes the zinc anode to deteriorate, while no physical deterioration takes place at the carbon cathode.

The combination of dissimilar metals in the soil will create the same current flow conditions, with the soil acting as the electrolyte, as takes place in the dry cell battery.

The position of the metals in the electro-chemical series will usually determine which metal will corrode to another metal or metals. Those metals low in the series, the less noble metals, will usually corrode to the other metals above them. Pipes or fittings of mild steel will corrode to pipes of cast iron, chrome steel, copper, lead, etc. Galvanized pipe or fittings will corrode to mild steel until the coating of zinc has been consumed.

Galvanic corrosion can also take place in a single pipeline composed of only one type of metal. This is due to the different concentrations of a certain chemical in the soil, different kinds of chemicals, and also because of variations in the amount of oxygen present in the soil.

One of the most common soil conditions that causes pipe corrosion is the presence of cinders in the soil, especially if the cinders are in contact with the pipe.




**THE DRAWING ABOVE shows part of the cartoon by Bob Lem, Portland Gas & Coke Co. artist, for the safety contest staged by the Oregon utility recently. Doing a switch on the usual safety contest formula of portraying SAFE practices, Portland Gas & Coke had Artist Lem pen as many UNSAFE acts as possible—then told employees to name as many as they could. The payoff was $100 in prizes, and was awarded for persons naming the most unsafe operations pictured and the ones recurring most often in the cartoon.**

The placing of pipe in clean homogenous soil and the use of protective coatings on pipes are part of the protective measures taken to control galvanic corrosion.

Bio-chemical corrosion, the third type, is caused by the chemical produced by sulphate-reducing bacteria in certain soils.

These bacteria create hydrogen sulphite, which, in turn, reacts upon the metallic pipe, causing a form of galvanic corrosion. Various means have been used in controlling these bacteria, with the methods used in controlling galvanic conditions being most widely accepted. Electrolytic corrosion and galvanic corrosion are the two types of corrosion experienced on Equitable Gas Co.'s distribution system. And the most rapid loss to these underground lines is caused by the combination of the two.

A truck being used as a traveling laboratory at the present time, although not designed for this particular type of work, has been found to be very satisfactory for carrying the equipment necessary for corrosion tests and investigations. The truck is of one-half ton capacity and the body design is referred to as a Pittsburgh Railways Co. route foreman's truck body. This body design is the result of numerous recommendations made by employees of the Pittsburgh Railways who use this particular type of truck.

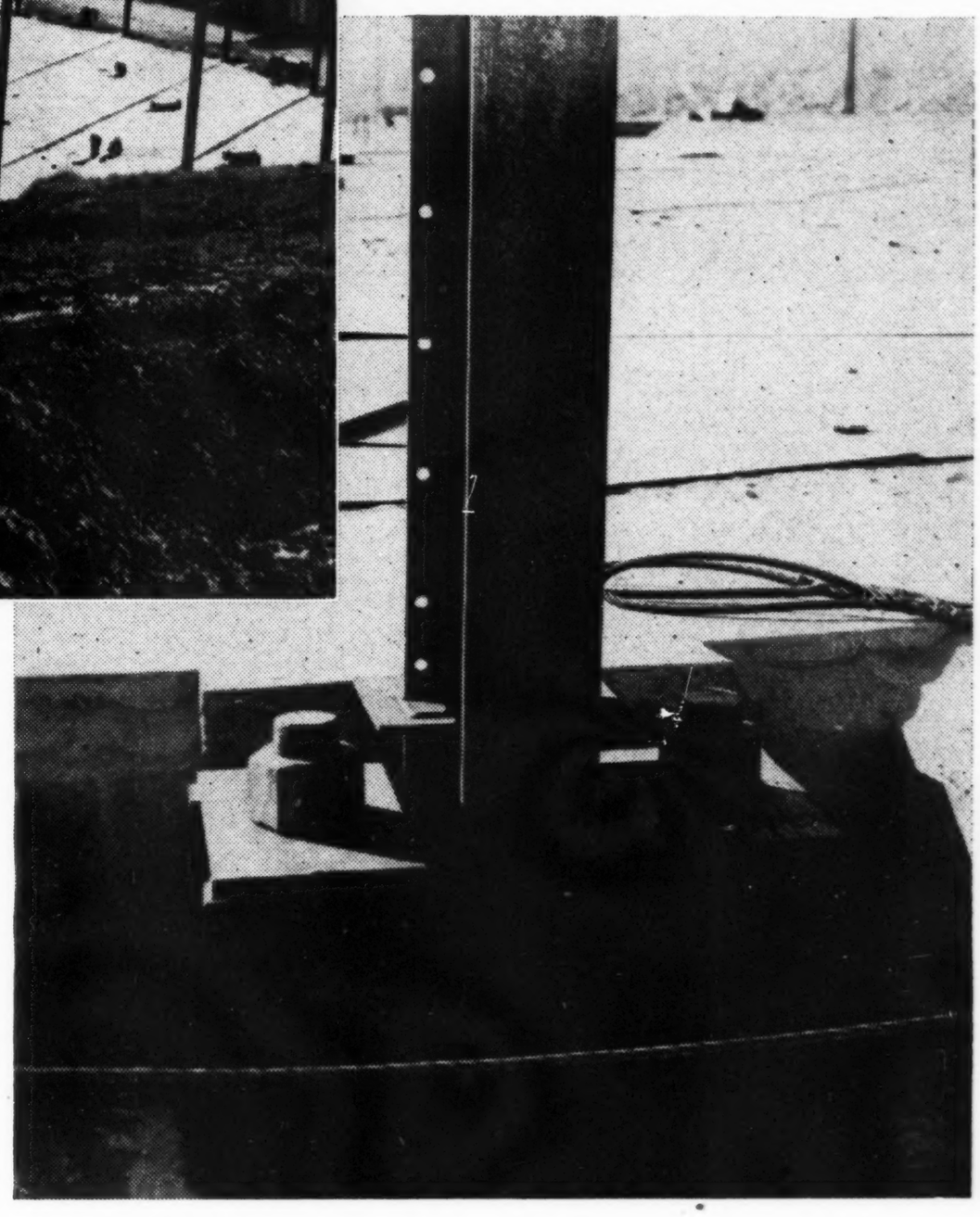
The overall body measurements are 6 ft long, 4 ft wide and 34 in. high. Each side has three compartments with two additional compartments located in the rear. The right side of the body has two compartments measuring 36 x 21 x 13 in. and one smaller compartment measuring 34 x 10 x 12 in. The left side of the body has two compartments measuring 36 x 21 x 13 in. and one smaller compartment measuring 13 x 13 x 13 in. The larger compartments on both sides are partitioned both vertically and horizontally in various manners which neatly accommodate the meters, tools, wires, etc., used for tests and investigations. One of the rear compartments measures 36 x 20 x 20 in. and the other measures 60 x 48 x 10 in. This larger compartment will accommodate bars or rods not over 5 ft in length, rolls of wire, cables, etc.

Another feature of the truck body is the one-man-operated ladder rack that at the present time is supporting a two-section 22-ft extension ladder.

These various compartments have proven very adaptable for carrying the necessary equipment used in corrosion investigations, which include a chemical kit for soil testing, a Weston millovat-milliammeter, a thermite welder, pipe coating tester, and auxiliary equipment.

AT LEFT is view of holder site, looking toward San Francisco.

BELOW: Base detail, showing how holder anchorage is secured.



# Mammoth Holders to Help PG&E Over Winter Hump

RISING out of the Point Richmond hills across the bay from San Francisco is one of two new 17-MMcf gas holders recently under construction for Pacific Gas & Electric Co. The company's two new holders, one in San Francisco, the other at Point Richmond, will be the largest gas storage facilities in the west. They are patterned after holders recently constructed by Brooklyn Union Gas Co.

Exclusive

PG&E's twin holder facilities cost $8,350,000 and will provide operating storage and emergency standby, lessening the danger of shutoffs and shortages experienced by the company during California's coldest winter last season.

## Excavation

Koppers Co. Inc., contractors for both the PG&E and Brooklyn Union Gas Co. tanks, removed some 60,000 cu yd of rock from the Richmond hills before hitting bedrock suitable for holder anchorages. Bulldozers and carry-alls labored weeks to gouge out the red sandstone hillside to a maximum depth of 55 ft—and to smooth a 50,000 sq ft area to accommodate the tank's 254-ft diameter.

Fifty portable welding machines sealed every joint, insuring tight seams in the gigantic piston cylinder which moves within a rigid-frame, steel framework. Unlike older style tanks, the new Richmond holder will be piston-type. Its top, 379 ft high, is stationary, while an inner cylinder expands and contracts with gas pressure. Twenty-eight steel columns anchored in 9½ ft of solid rock will support the inner cylinder.

The 28 columns, 8 ft square with spread footing 10 x 10 ft, are stationed on solid rock, while five columns which couldn't be anchored float, with enlarged spread footings.

Twenty-eight landing pads, 3 x 3 ft, of reinforced concrete are interspersed between the support columns. A second ring of landing pads, set upon the holder's ¼-in. steel plate bottom, will be located 70 ft in from the circumference.

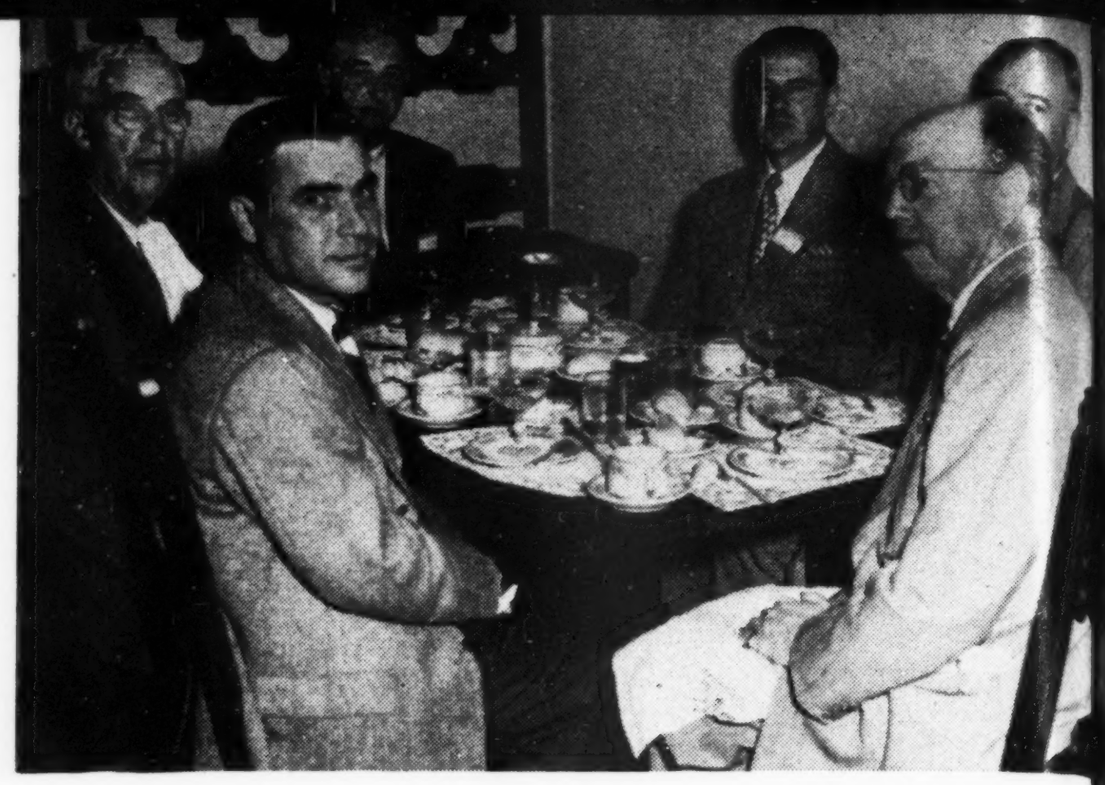
The holder's bottom rests on a 6-in. concrete floor set on bedrock. Between the concrete base and the tank's welded steel bottom is a 1-in. layer of sand. Twenty-six hundred yards of regular mix concrete were used for the foundation.

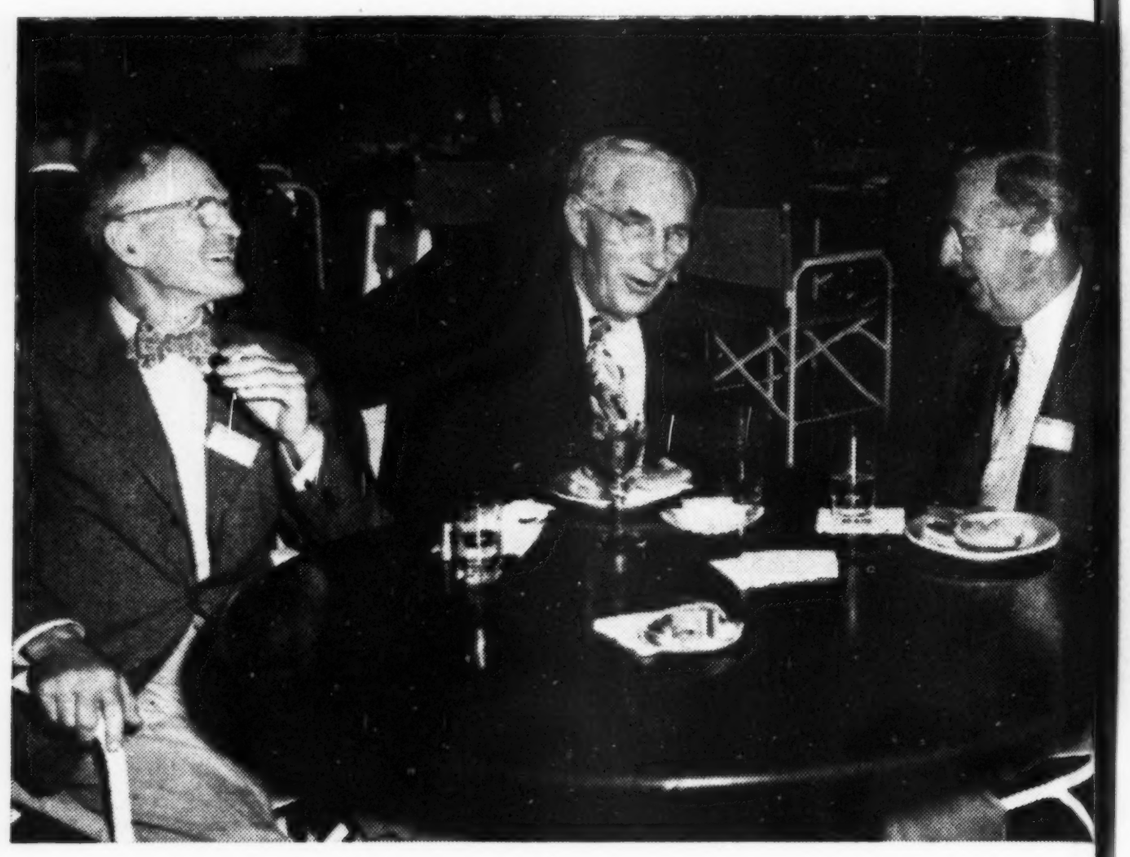
Contraction and expansion—the raising and lowering of the inner piston—are facilitated by double-wheeled action along each of the 28 steel support columns.

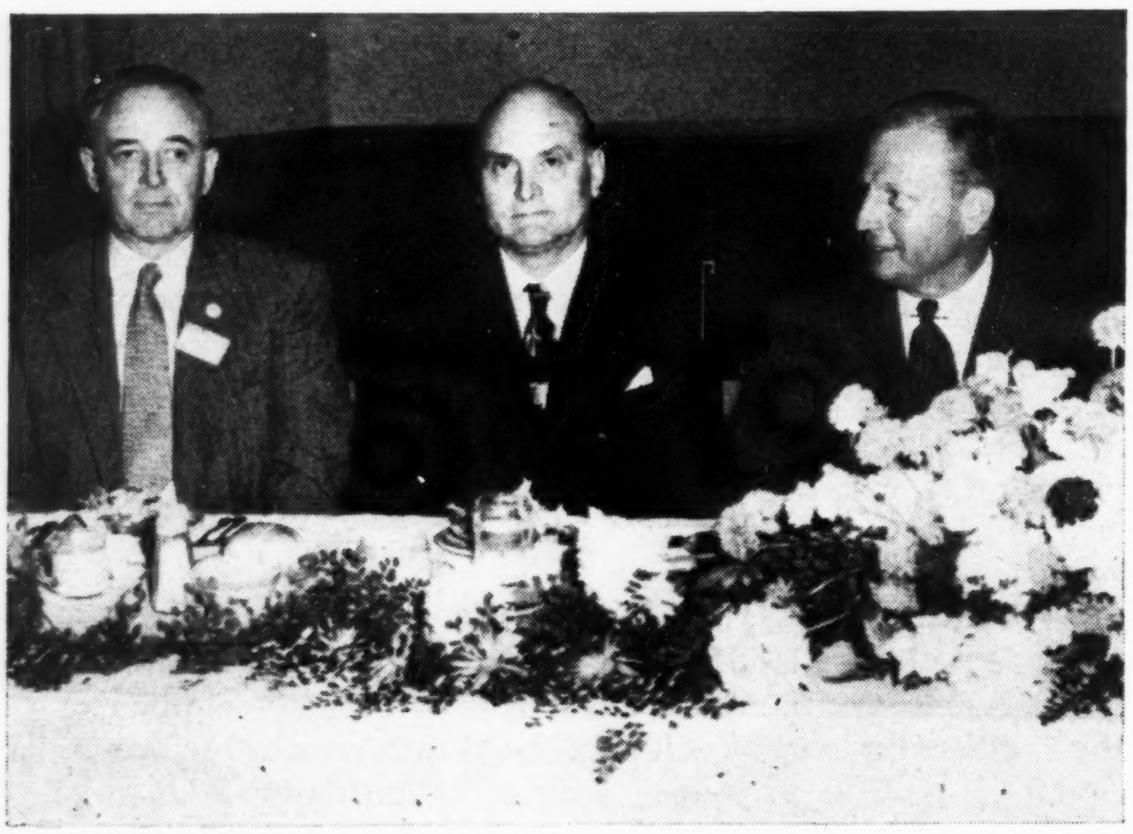
## Piston Details

The piston itself rests on a center landing pad 8 ft square. As with similar structures, the 3/16-in. steel-plate roof will be hoisted into position by air pressure during construction. Once atop the holder, it will be permanently welded in place. Normal operation will see the tank remain at fixed height, while the inner piston varies according to gas volume, coming to rest on the landing pads during peak capacity.

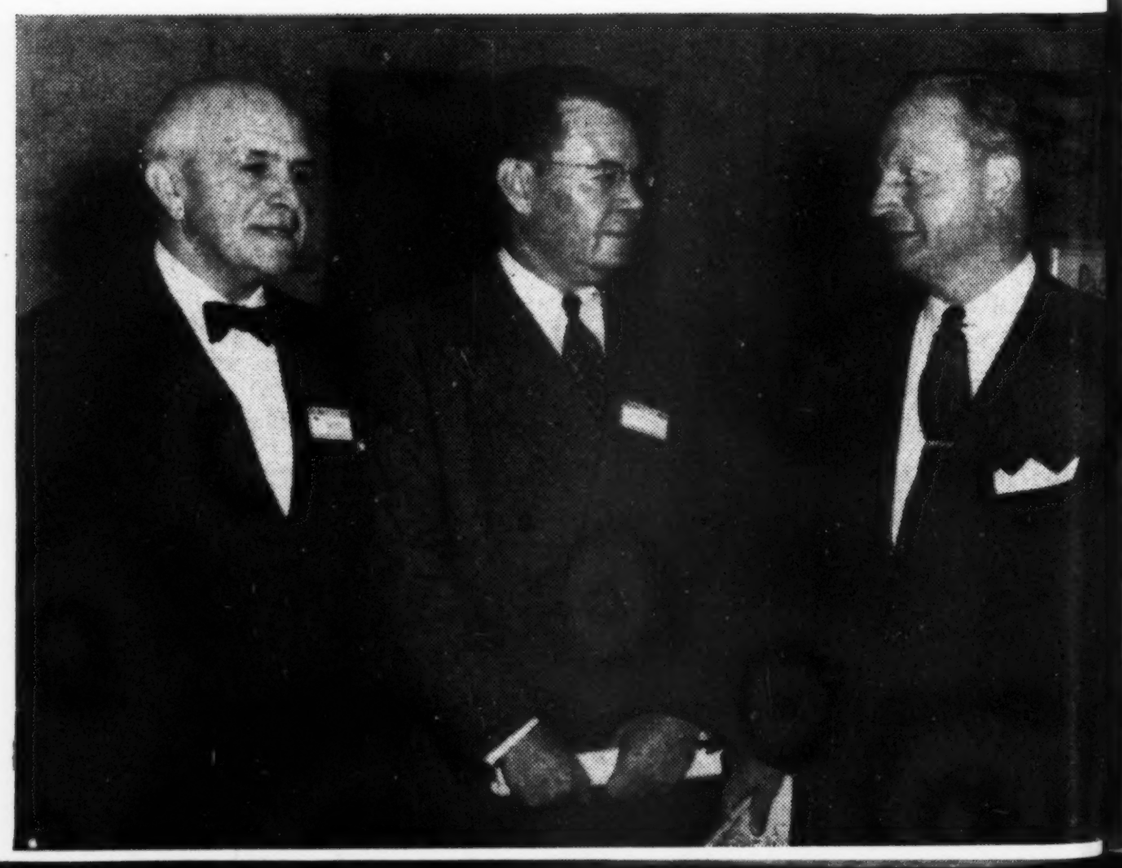
Plans for the Richmond holder call for a compressor station equipped to operate at 4 MMcf per hour capacity. Compressors will be motor driven. Four electric-driven compressors, each powered by a 300-hp motor, will be installed, one acting as standby. An electric substation will be built at the holder site to operate the motors.







HOLMES
Sept 13 - PAGEANT of IND
Sept 20 - SWEDEN
Sept 27 - VIRGINIA
Oct 4 - SWITZERLAND
Oct 11 - NEW MEXICO



# Stormy Weather on the Coast

## Rough weather ahead as load competition stiffens, PCGA conventioneers agree

THE interplay of peak load problems, sales direction, economics, rates, and the buyer's market was forcibly brought out in key addresses at the 56th annual meeting of the Pacific Coast Gas Assn., held in lovely Santa Barbara, Calif., Sept. 7-9.

Peak load problems, which are shifting direction in the West, are focusing atention and mounting concern on the relationships of the house heating load and the so-called "basic load" and upon the peculiarities of existing rate structures; industry financing in turn is closely tied in with the soundness of present loads and rate structures; and finally, sales direction, operating in a rising buyer's market, is presently failing to supply one of the answers to all these problems. Such were conclusions to be drawn from the bulk of the headline papers presented during the 48-hour conclave.

Keynoter in fact as well as in name was Arthur F. Bridge, president of Southern Counties Gas Co., Los Angeles, who delivered the outgoing president's address. So meaty was his excellent talk that it is reproduced in part in the "Digests" department of this issue.

O. R. Doerr, Pacific Gas & Electric Co. (San Francisco) vice president, in his contribution to a three-way symposium on "The Buyers' Market and Our Competition," substantiated his remarks on the rate situation with concrete figures which illustrated some of the results of present rate faults as well as lack of proper balance in appliance sales. The figures he gave showed how heating sales have forged ahead in the past 10 years while range and water heater sales have softened.

The rate disparity theme also ran through the symposium talk by F. M. Banks, vice president, Southern California Gas Co. However, not only is the competition practically giving its juice away to power competitive appliances, but the situation has been heightened by the narrowing of the price gap between gas and electric appliances. Years ago, he said, the wide gap was bridged by the electric industry by its practice of lengthening installment plans to a point where monthly payments were actually competitive. Now, however, price differential has been sharply reduced, further erasing gas' competitive advantage.

### Sales Ratios

Dealers, of course, are taking the easiest way, and their tactics can be destructive to the cause of gas. Mr. Banks cited national sales ratios of gas to electric ranges (in 1933, 14.2 to 1; in 1947, 2 to 1; in 1948, 1.8 to 1) and water heaters (in 1939, 5 to 1; in 1947, 1.6 to 1; in 1948, 1.4 to 1) as evidence of the seriousness of the situation. Predicting that utilities may one day have to go back to direct selling because of —again—peak load problems (although such a drastic measure is not at present needed), he concluded that:

1. Utilities must support national advertising and promotion, being in the best position (as against in the electrical sales business, where manufacturers bear the load) to do this.

2. Utility executives must keep in touch with the competitive picture in their own territories.

3. Management must give more informed support to sales managers.

4. More salesmen and more sales training of dealer personnel are needed.

Last of the trio in the symposium, W. H. Tappan, Tappan Stove Co., attacked primarily the problem of lack of salesmanship caused by the war-born practice of order-taking. He decried trade-in chiseling, plugged for dealer cultivation, pointed out the greater strength of combination dealers over exclusive dealers, advocated dealer concentration on fewer brands and greater dependence on salesmanship, and suggested that salesmen be made specialists.

Servel Chairman Louis Ruthenburg, whose talk on "Business Management in a Changing Economy" touched on many economic problems in the industry, added his plea to those of other speakers for a return to salesmanship. He also pointed out the dangers he felt to be inherent in the heating load, and backed up Mr. Banks in his urging that utilities not be too dependent upon dealers.

Back to peak loads again: This perennial problem was explored in another three-man symposium on "Equating Gas Supply and Customer Needs" which featured J. S. Moulton, PG&E; E. L. Hall, AGA Lab, and William Moeller, SoCal. Mr. Moulton introduced the series with a talk on gas supply and peak load requirements, with Mr. Hall outlining various programs for meeting peaks now under way in the east and Mr. Moeller telling about what California companies are doing in this regard.

Other excellent speeches and speakers included Leigh Whitelaw's report on the excise tax lobby (see "Digests"); A. W. Turner's (SoCal) on the subject of "Safety Pays Off"; "Our Rising Welfare State," wherein Dr. E. P. Schmidt, U. S. Chamber of Commerce, joined Mr. Ruthenburg in telling about the ubiquitous threat of socialism; and Eugene Bashore, Blyth & Co., New York, who brought his hearers up to date on the market position of utility securities in a talk titled "New Money and Our Expanding Facilities."

Employee relations was targeted in the final session, held Friday morning, Sept. 9. Well received was the talk by G. T. Fonda of Weirton Steel, who told why "Employee Relations at Weirton Steel Is Good Business." In the town of Weirton, he pointed out, executives and workmen alike live as well as work. Labor belongs to an independent union, which has not brought about a work stoppage for 16 years. When Weirton was recently incorporated as a city, the company's labor policies were indirectly but overwhelmingly given approval in the results of the mayorality election, which the company president won in competition with a union man.

### Key to Success

Why so successful? Because, said Mr. Fonda, each man is treated as an individual, grievances are handled speedily, and wage troubles are averted through a policy of sound management-employeee communication which results in an unusually well-developed appreciation of the necessity of the company's remaining competitive for the good of all personnel.

Outstanding services to the association and to the industry were rewarded with honors and citations during the convention. Three outstanding members who are now retiring from active duty in the industry — Frank Wills, gold medal and medal of honor winner and author of many expert studies on gas industry problems; Harold R. Basford, association member for 43 years, president in 1924, gold medal holder, and originator of the Basford Trophy; and William M. Henderson, 43-year member, gold medal winner, former association secretary—these three men were tendered honorary life memberhips.

J. H. Lewis, Concord, Calif., who retired

*(Continued on P. 62)*

**Top to bottom, left-hand column:**

**That proud look on the face of George W. Smith is justified—he was convention arrangements chairman; J. W. West Jr., AGA, who subbed for R. W. Hendee on the program, juggles food.**

**J. H. Lewis, center, receives citation from Otto Ketelsen, San Diego Gas & Electric Co., as PCGA's Clifford Johnstone, SoCal's R. D. MacMahon, and Louis Wollenberg of Coast Counties look on.**

**Russian expert Gen. Ira Eaker is flanked by A. F. Bridge, outgoing PCGA president, and R. A. Hornsby, Pacific Lighting, program chairman.**

**Registrar George Bowersox, Coast Counties, R. F. Ogburn, SoCal, and Bob Smith, SoCal, smile wearily but bravely as clerks ignore the cameraman.**

**Top to bottom, right hand column:**

**Clockwise they are E. L. Hall, AGA lab; H. R. Basford, retired; Clifford Johnstone; J. S. Moulton, PG&E; A. F. Bridge, SoCounties; F. S. Wade, SoCal.**

**Elder statesmen of the gas industry honored at the show enjoy a laugh—William Henderson, SoCal; H. R. Basford and Frank Wills, ex-PG&E. All three were elected to honorary life membership.**

**Manufacturers' hierarchy, at the speakers table—T. T. Arden, Grayson Controls; Harold Massey of GAMA; C. A. Gabriel, Monarch Heating; W. J. Bailey Jr., AGE, with Ed Kern, PCGA, behind.**

**Speakers Louis Ruthenburg, Servel, and Eugene Bashore, Blyth & Co., finance experts, with Mr. Hornby.**

# Financing Our Expansion

**Utilities' position relatively favorable despite change in pattern of investments**

By **EUGENE BASHORE**

Vice President, Blyth & Co.

TEN years ago there were 17 million gas utility customers; today there are 22 million. Ten years ago annual gross revenues were $800 million; today they are twice that, $1.6 billion. Ten years ago gas plant expenditures were on the order of $100 million a year; today they are $800 million a year.

The gas industry has had and still has a tremendous undertaking to finance and construct the facilities needed to meet the service requirements of its customers. Budgeted expenditures for the four years, 1949-1952, according to AGA figures, are $2.7 billion, an amount slightly greater than the aggregate of all expenditures for the last ten years. Probably no more than 25 to 30% of your capital requirements can be derived from internal sources. That means that very close to $2 billion must come from public markets.

Capital belongs to people. It is not an impersonal thing and it is not a force antagonistic to people. Capital is often symbolized as a paunchy old gentleman with bloated jowls and a fat cigar. That is not a correct picture. Actually, the largest aggregation of capital is with the life insurance companies, some $56 billion, which they, as custodians, invest for their 78 million policy holders.

For some 15 years national policy has been directed toward a redistribution of the wealth of the nation for the purpose of social reform. That is our present policy.

During the past two decades there has been a great leveling of real income. Personal savings, while running at a very high rate, now rest with people who traditionally save through means other than the direct purchase of securities. And they turn to life insurance or to savings banks, savings and loan associations, and similar agencies through which their savings are returned to the economy. Life insurance has become by far the most important single channel through which personal savings flow into new long-term capital for business. Last year the admitted assets of American life insurance companies increased by $3.8 billion.

Insurance companies and all of these other agencies are obligated by laws or by the nature of the funds entrusted to them to seek safety first investment, mostly in bonds and mortgage loans. These funds are not available to assume the full risk of business enterprise.

The result is a fundamental social condition which produces an unbalanced demand for investment in senior securities and what many thoughtful persons consider is a dangerously inadequate source of risk capital..

At a time when the government was rapidly expanding our public debt, bond prices were maintained at a high level. They reached a peak in 1946 and have now receded only a little from that high point. A composite of public utility A rated bonds never sold to yield less than an annual average of 5% during the 10 years of the 20's; less than an annual average of 4% during the first five years of the 30's; or less than 3½% during the last five years of the 30's; and from 1940 the yield declined progressively to 2.71% in 1946, from which only a fractional change has occurred to date. That briefly has been the course of interest rates over the last 30 years on good, but not the highest grade, bonds.

## Temptation

So abundant and so cheap is debt capital, that there is a great temptation to make maximum use of borrowing. The danger, of course, lies in overborrowing. Too much not only interferes with the sale of junior securities, but precludes further debt financing. If you borrow the maximum today when lenders are willing to loan at a high debt ratio, you will find you have cut off your only avenue of financing in the future when the pressure to loan is not so great.

At present the market for preferred stocks can only be described as un certain and undependable. From tim to time the institutional demand fo fixed rate investments has overflowe the bond market and at times prefe red stocks have been eagerly bought But then, this institutional deman proved temporary and erratic. So w have a good deal of fluctuation i demand which results in a good dea of price fluctuation.

A market based upon the insitutiona demand for preferred stocks is not ver reliable. The market for preferre stocks is a broad one only when it i based upon a demand from a host o small individual investors.

We did a horrible thing back in 193 when we made corporate dividend fully subject to individual income taxes Insitutional investors are not taxed o this basis. Dividends received by on corporation from another are taxed a the effective rate of 5.7% so that a 4% preferred stock yeilds 3¾% after taxes But dividends received by an individua are taxed at his full rate and a 4% preferred stock may yield after taxes as little as 2 or 2½%.

If the conditions underlying our capital markets have created an unbalanced demand for fixed rate securities, then you would expect that the market for equity capital is unsatisfactory.

Many thoughtful people are alarmed at the inadequacy of the equity market and the grave dangers which follow as a consequence. They say that if those who are able to save do not for any reason supply risk capital, then in any period when corporate earnings are insufficient to sustain an expanding economy, government will subsitute for private enterprise.. Why private enterprise would not supply risk capital is immaterial. It may be lack of education, lack of incentive to take risk, changes in the betting odds or the fact that powerful forces have succeeded in destroying confidence in business.

I can well believe that all of these elements are present, but I am not able to prove as of now that our equity capital market is dangerously inadequate. Persuasive but inconclusive arguments can be advanced on both sides.

Transcontinental Gas Pipe Line Corp. was able to raise the equity capital required for its $190 million project which is being built from the ground up. Tennessee Gas Transmission, Texas Gas Transmission, Mississippi River Fuel, Northern Natural Gas—practically all of the interstate gas transmission companies have come into the market

for equity capital and have obtained it. So have many of the gas and electric companies. But that is not conclusive. We do not know how many others would have come if equity capital were more abundant and less costly. We do not know how many businesses of all kinds would even now be expanding if the equity market were more favorable.

But I do know that very little equity capital is being raised and that the trend is downward. With the total of all corporate financing running above $6 billion, annually, common stock financing has been:

| | | |
|---|---|---|
| 1946 | $890 | million |
| 1947 | $778 | " |
| 1948 | $611 | " |

Secondly, I do know that, on the basis of an historical comparison, stocks appear low in price.

In 1939, the average yield on a composite of AAA bonds was 3% and the yield on a composite of 125 industrial stocks was 3.9%, a differential of less than 1%. In 1949, the bond yield was 2.7% and the yield on stocks was 7.1%, a differential of more than 4%. In 1939 these stocks sold at 15.7 times earnings; in June of 1949, they sold at only 6 times earnings.

The weight of evidence would seem to indicate that few people are willing to supply risk capital by the purchase of common stocks and then only at prices which are very low when measured by the usual standards of value.

Let me emphasize that public utilities are more benefitted, or less harmed, however you view it, by the change which has occurred in the pattern of investments than other forms of business. If debt capital is abundant and cheap, public utilities can properly employ a higher percentage of borrowed capital than any other form of business. If the preferred stock market is undependable, public utility preferred stocks as a class are most acceptable to institutional investors. If the market for risk capital is inadequate and costly, public utility common stocks have moved a long distance away from the area of speculative risk to the status of investment and public utilities are able, at least without regard to cost, to obtain such equity capital as is required.

Just because public utility companies have not so far been seriously hurt by the social and economic trends which I have described, you should not permit yourselves to dismiss this subject from your continued consideration because, in a large way, they affect all of us.

# From Deficiency to Oversupply

**Abrupt shift in West Coast fuel oil supply, space heating saturation worry utility men**

**By ARTHUR F. BRIDGE**

President, Southern Counties Gas Co., Los Angeles

IN the West we are in the midst of rapid changes, which profoundly affect our industry. To a considerable extent the economic transition which we are now experiencing is the war's aftermath, but the abruptness of the shift from deficiency to oversupply in certain basic commodities, particularly fuels, is unprecedented in our recent history. It seems appropriate, therefore, to examine a few of the problems which these changing conditions have thrust upon us, some of which are common to the nation's gas industry, while others are peculiar to the Pacific Coast, or to California.

First, a statistic or two to indicate the relative importance of the Pacific Coast gas industry. With minor exceptions, California, Arizona, and Utah are supplied exclusively with natural gas, while Oregon and Washington now receive only manufactured gas and LP-Gas. Domestic and commercial customers and sales, in the first three states mentioned, account for approximately 23% of the national totals for natural gas, and the manufactured gas companies in the two northwestern states represent about 2% of the corresponding national figures. There are now approximately 2.8 million gas customers in Arizona, Utah, and California, and about 194,000 in Oregon and Washington.

## Rate Relief

One of the most important and urgent problems confronting most of our local, as well as national, gas utilities is the need for adequate rate relief. The primary causes of declining net revenues are common to all—higher price levels for wages, supplies, and capital, and for fuel and/or gas at sources. One exception to this generalization should be noted, however—that of the manufactured gas companies in the Pacific Northwest. They are faced with high costs of gas-making materials, and very stiff electric competition, based on cheap, government-subsidized hydro power. Despite recent reductions, reflecting successive cuts in fuel oil prices, their domestic rates are still above the competitive level, and in the range of diminishing returns, hence the obvious solution lies in lower production costs per Btu, rather than higher rates. This, in turn, calls for natural gas.

Repeal of the excess profits tax in 1945 boosted net earnings considerably, and for most of our companies the early post-war trend was upward, but now a decided reversal has set in, and during the past year the California gas companies have experienced a rapid shrinkage of net income, and almost simultaneously most of them have filed applications for general rate increases. Prior to taking this action, they have, since 1945, absorbed the effect of four rounds of wage boosts, aggregating some 80% of the 1941 base rates, and of increases in average field costs of California gas ranging up to 96%.

While these important operating expense items may become stabilized at present levels, there are two other major factors which will certainly cause a continuing decline in rate of return, and which therefore will necessitate relatively large and successive increases in general service rates to offset them. These factors are first, inflated unit costs for capital, applied to an abnormally rapid expansion of facilities; and second, a severe drop in industrial gross and net revenues, due to (a) decreased fuel requirements of industrial customers; (b) loss of load to fuel oil sold at distressed prices; and (c) lowered rates which are geared to the posted price of fuel oil.

Although it appears probable that the consuming public, and uninformed public officials, will be prone to disregard the fact that, for many years past, the trend of domestic and commercial gas rates has been consistently downward, and will oppose the granting of necessary but belated rate adjustments, merely because they are contrary to the prevailing price trends of some other services and commodities; still, with but few exceptions, regula-

tory commissions have recognized the necessity for granting adequate and prompt rate revisions, in order to restore earnings to levels sufficient to attract the relatively large amounts of capital needed for plant expansion. To the extent that they fail to take such action, the present high standards of gas service will inevitably be impaired.

The magnitude of the effect of higher capital costs is not generally realized. It is causing an abrupt rise in the unit investment (per customer and per M of sales) which will continue so long as existing material and labor price levels prevail. This impact on the rate base arises from capital additions required to serve new customers, at two to three times the pre-war unit cost, plus replacements of older facilities at even greater price differentials. Thus, the plant investment becomes rapidly and progressively saturated with high-cost facilities. The following example, typical of the California situation, is cited to indicate the importance of this factor.

The pre-war (1941) level of invested capital per active meter was $172. By January 1945 this had grown to $174, but during the three-year period 1947-1949 inclusive, despite record meter growth, the added capital per added meter averaged $432, raising the cumulative level per meter to $219, or 26% above that of January 1945. The current annual rate of increase in unit investment is about 8.5%.

The industrial customer, who uses large volumes of natural gas on an interruptible basis, is almost indispensable to a natural gas company, and vice versa. This is particularly true where the principal supply is derived from oilwell gas, which, to avoid wastage at the source, must be taken by the purchaser at a relatively constant rate, and either stored underground during off-peak seasons, or sold to industry at rates which will successfully compete with other available fuels.

For many years most of the gas produced and utilized in California has been oilwell gas, and this is also true of the gas imported from the Permian Basin of Texas and New Mexico. The California companies have developed a large market for interruptible gas, which serves to absorb both the seasonal variation in firm load, and fluctuations in supply unrelated to gas requirements. In 1948, for a typical company, this load accounted for 28% of total volumetric sales, and 19% of gross revenue. Since November 1948, the posted price of bunker fuel oil at California refineries has declined 42%. The rate reductions accompanying this oil price change, and competition with distressed oil at even lower prices, have caused very sharp drops in sales volume, gross, and net revenues derived from industrial load, and further declines are anticipated.

During an almost equally brief period, the Pacific Coast has undergone an abrupt shift from famine to feast in its total supply of industrial fuels, and this change is bringing gray hairs to the heads of many executives in both the oil and gas industries.

An interesting illustration of the ill-wind adage may be noted in the fact that the fuel oil price reduction, which has slashed the natural gas companies' industrial net income, benefits the manufactured gas companies of the Northwest by correspondingly reducing their costs for gas-oil.

## Oversupply Factors

The oversupply of fuel oil is due to several factors, which have combined to cause Pacific Coast stocks to mount steadily since February 1949 at an average rate of 100,000 bbl per day. This rate of accumulation is the fuel equivalent of about 570 MMcf per day of gas, which volume may be compared with total potential requirements of California interruptible customers of 700 MMcf per day.

From the fuel marketer's standpoint this situation is not improving, nor is a complete solution simple or obvious. The complexity of the problem is indicated by the following excerpt from a letter of July 8, 1949, from L. A. Cranson, president of the board of directors of the Oil Producers Agency of California, transmitting a special committee report entitled "Review of California Oil Industry Conditions":

> During the latter part of 1948, and the first of 1949, we passed from a period of scarcity into one of abundance, insofar as some products, particularly heavy fuel oil, are concerned, and with the decline in business activity in practically all lines, this condition has been accentuated.
>
> The increase of heavy crude and fuel storage has been due to several factors, such as dieselization of the railroads, the slump in industry requirements, the importation into California of petroleum and natural gas, the decrease in fuel used by ships, and the curtailment of military requirements.
>
> At the present time, statistics indicate that there is an excess of crude supply over demand in California. Were it practicable to reduce crude production by approximately 100,000 bbl daily, excessive additions to storage would be eliminated.
>
> While this report is concerned primarily with conditions in California and District 5, it should be pointed out that other oil producing areas in the United States have found it necessary to reduce production. Texas, for example, has reduced its production since the latter part of 1948 by approximately 900,000 bbl daily, while Louisiana, Mississippi, Arkansas, Oklahoma, Kansas and other states have likewise made reductions.

During the period of peak oil prices in 1948, several representatives of California industry urged that additional pipeline capacity, from Texas sources, should be constructed, for the sole purpose of providing a long-range, uninterrupted supply for existing and prospective new industrial customers. Recent experience has clearly demonstrated the economic impracticability of such a project, since, in the few intervening months, fuel oil prices have sagged to a point where such a pipeline, under prevailing prices for construction and for gas in the source fields, could not deliver gas to this market at a rate low enough to compete with fuel oil. The instability of the industrial market, both in price and volume, is a risk, inherent in our business, which is often overlooked by the public.

Last winter's abnormal demands, and our diminishing net income, focus attention on another problem which needs study and remedial action. This is the adverse effect on firm load factor of the unbalanced growth in space heating demands, and the unsoundness of our present rate structure as applied to this load. The following observations are based upon statistics for the companies supplying southern California, but they exemplify the situation which prevails throughout California, and to a considerable degree in natural gas territory generally.

1. Due to greater convenience than liquid or solid fuels, and its cheapness compared to electricity, natural gas has virtually no competition for the space heating load, and hence its use for this purpose has become almost exclusive.
2. It has decidedly the poorest daily-yearly load factor of any load component supplied. In southern California this figure is about 18 to 20%.
3. Per-customer and total space heating loads are rising much faster than other load components, because of:
   (a) More connected load per family unit in new homes.
   (b) Acquisition of all new potential space heating load, as compared to lesser proportions of other loads.

   The significance of this trend is shown by the following figures for the Pacific Lighting group of companies. During the period 1933-1949, the ratio of *average* temperature-corrected domestic and commercial winter sales, to the corresponding summer sales, has risen steadily from 2.2 to 2.9. On the January, 1949, peak day for these companies, the retail domestic and commercial space heating demand was 670 MMcf, equivalent to 75% of the *total* demands of the same customers, and to 67% of total retail firm sendout.
4. Primarily because of the very poor load factor noted above, the cost of supplying this load is much greater than for any other load component. Thus, the investment cost per Mcf consumed is relatively high, and most of the service cost consists of fixed annual components, dependent on demand, and unrelated to volumetric use.
5. Despite its higher relative cost, space heating gas is generally sold to domestic

and commercial customers at rates lower than those charged for their other uses, such as cooking, water heating and refrigeration. This results from the graduated block type of rate tariff, applicable to all uses of such customers, and under which the incremental seasonal heating consumption falls into the lowest price blocks. Furthermore, all of the *charges* for this service are on a volumetric basis, and none are fixed, or a function of customer demand.

6. Thus, the combined result of the foregoing factors is that, typically, the revenue derived from the sale of space heating gas is only a fraction of the corresponding cost of service, and unless the form and level of the schedules are drastically revised, this disparity will grow.
7. Electricity is the only effective competition for our domestic and commercial business. Its sales effort is directed against our most desirable domestic loads, and not against house heating. Our competitors employ promotional types of rate schedules, designed to favor the competitive loads which they seek, at the expense of their basic, non-competitive loads, (lighting and incidental household uses). They thus obtain an effective competitive weapon by subsidizing their water heating and cooking business, whereas we do the opposite; that is, subsidize our *only* non-competitive load. Surely our industry can, and should, do something to improve this situation.

### Underground Storage

As for the means of meeting our growing and already enormous space heating demands, a study of the comparative economics of alternative supply methods, clearly points to further development of underground storage as the optimum solution of this problem. Investment cost per unit of peak day deliverability is the dominant economic factor affecting the cost of supplying space heating in California because of the inherently poor annual load factor noted above. Cost analyses have repeatedly demonstrated that where underground storage is available, and is located relatively close to the major market areas, as compared to the primary field sources, it provides dependable, large volume, peak capacity, at lower unit costs than those of any alternative means presently known to us.

The advent of interstate gas to California has brought with it certain new problems. Among these is duality of regulation, involving the FPC and PUC. Where a public utility engages only in the transportation, distribution, and retail sale of interstate gas, it is confronted with dual regulation only in the fields of accounting and of certification of high pressure transportation facilities, but if it also wholesales for resale, the difficulties really begin. In the latter situation, FPC's jurisdiction extends to fixing the interstate wholesale rate, but does not apply to gas sold to another utility for its own use, such as for steam electric generation, or compressor station fuel.

A number of state commissions have become increasingly aware of FPC's encroachment, both present and threatened, into their regulatory domains, and at the annual meeting of National Assn. of Railroad & Utilities Commissioners last fall a resolution was passed recommending enactment of amendments to the Natural Gas Act, designed to exclude from jurisdiction of FPC any company whose facilities are wholly within one state and which transports interstate gas only from some point therein to areas of distribution. This proposed exemption would apply even though such company sells at wholesale for resale within the state.

There were introduced into the House and Senate this spring two companion bills, which would, if enacted, accomplish this objective. NARUC has recently endorsed these bills and authorized its legal representatives to seek favorable Congressional action thereon, while several state commissions, including PUC, have adopted resolutions in support of the proposed legislation.

# Progress on Excise Tax Front

## GAMA expresses hopes for repeal in 1950 as unified campaign makes strides

By H. LEIGH WHITELAW

Managing Director, GAMA

EVERYONE in the industry has been convinced that excise taxes are discriminatory and definitely contribute to unemployment. The reasons are obvious. Distributors and dealers could not build up an inventory of equipment on which they had paid this tax and then face the day when the excise tax would be removed. In a way, this is what they call a hidden tax. The consumer eventually has to pay it, including mark-ups.

The consumer has not been aware of this tax to the point of protest, although he has actually postponed the purchase of vitally necessary replacement equipment, pending the elimination of this tax.

The participation of GAMA and its members in the movement to encourage removal of excise taxes was studied very carefully from all angles. We have had a very active excise tax committee working on this problem for several years.

We knew that other business interests likewise affected by the excise tax were very active in Washington and had been spending a great deal of time in an effort to present the problem in the best possible manner to the members of Congress.

We were also aware that any open and active campaign on the part of the association or the members could subject us to the censure of violating the lobbying act. There was an additional factor which we considered very seriously: Widespread and badly timed publicity on the possibilities of excise tax elimination could further retard business, create more unemployment, and possibly have some very dangerous repercussions.

On the advice of our excise tax committee and our general counsel, we decided that we should comply with the regulations of the lobby act and file under its requirements. We thoroughly investigated the possibilities, and then decided to retain a Washington public relations representative.

### Time Was Ripe

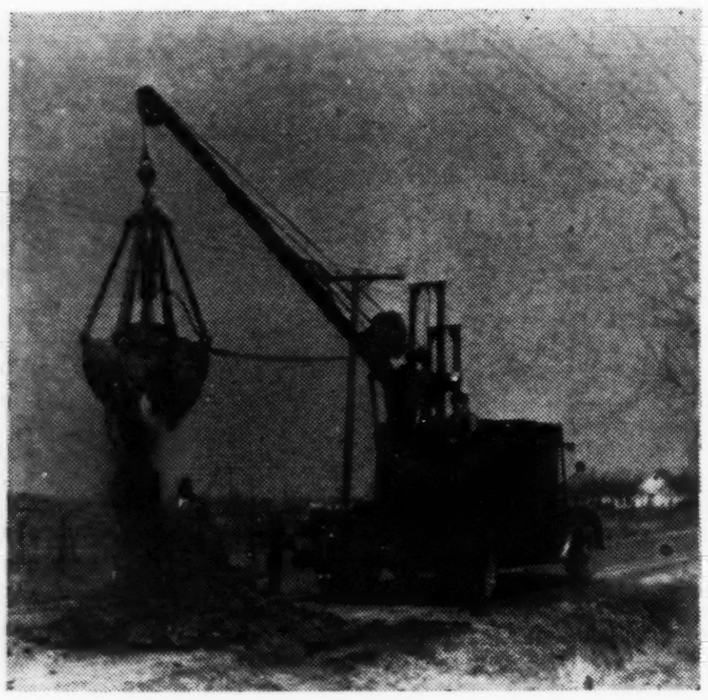
We believe our timing was very good. Many other industries had made this step, and in a far more expensive way, several years ago. An early and interesting reaction received from members of Congress was that while they were faintly aware that this excise tax was imposed on our equipment they did not realize the serious effect it was having on the general economy.

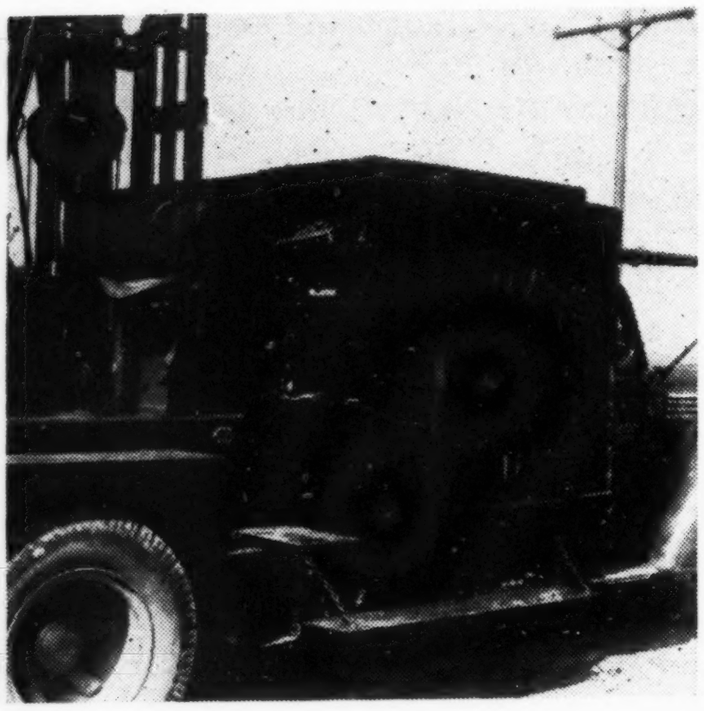
The response received and support obtained gave us a good indication that when the time was right politically, these taxes would be eliminated. We were surprised to learn how many members of Congress were not conscious of the fact that the manufacturers' excise tax was imposed on domestic ranges, hotel and restaurant equipment, water heaters and refrigerators.

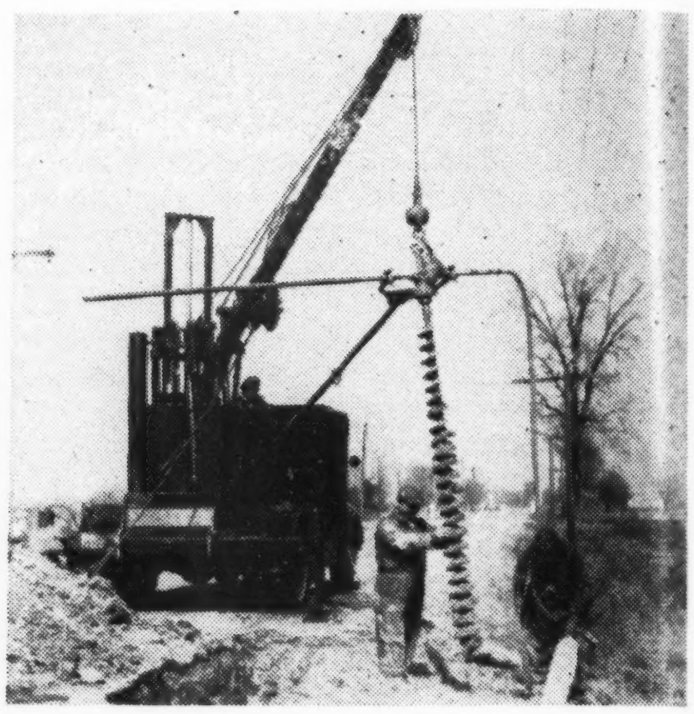
In the progress of our educational campaign, we joined hands with other associations and other industries in an effort to present a united front and have the support of as many groups as possible to attain the desired objective.

We soon realized that with a deficit apparent in the balance of revenue collected as compared to a set federal budget of $41 billion, repeal of the

# OPERATING IDEAS AND EQUIPMENT





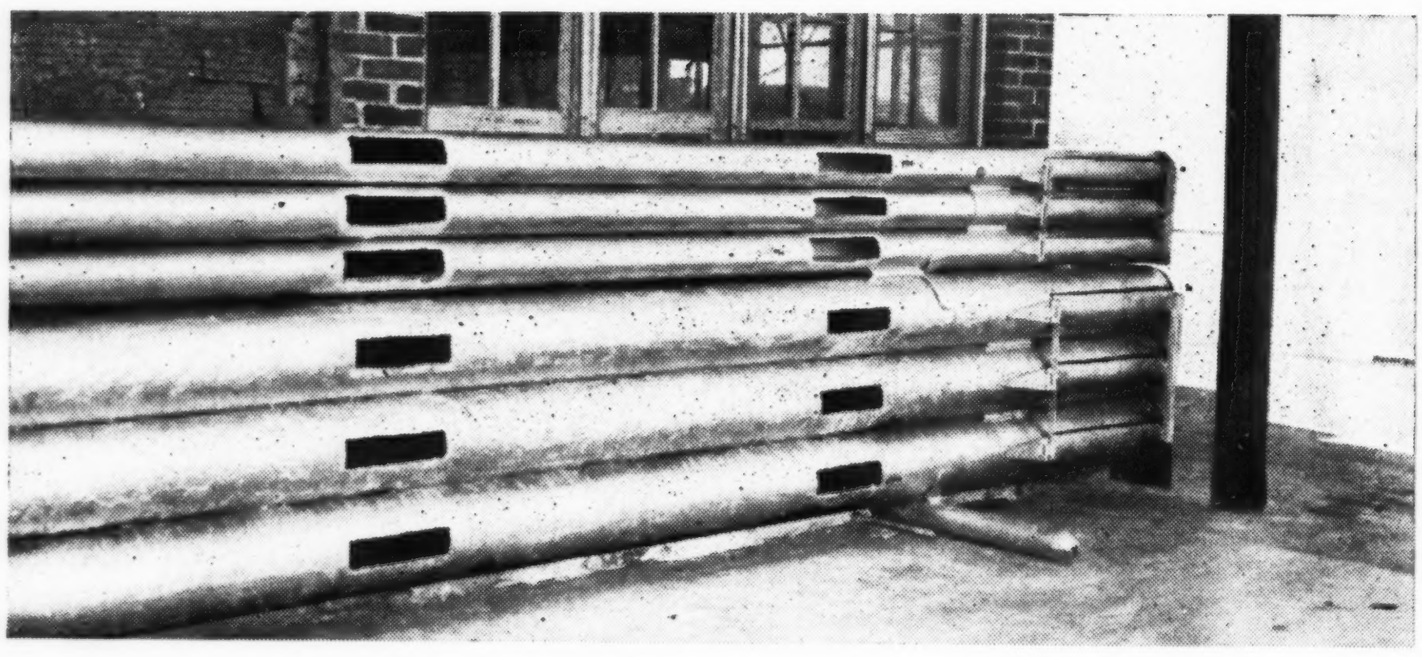


**Wisconsin Gas & Electric Co., Racine, has devised a complete - in - itself leak repair unit. By fitting one of its Bucyrus - Erie Hydrocranes with an air compressor, it can operate earth augur and pneumatic tools from the truck itself. At left the machine is shown removing dirt from over the pipe where gas leakage has been detected. At center is shown the cabinet built over the air compressor to house tools, pipe fittings, etc. At right the earth augur is shown burying a magnesium anode near the pipe.**

## 'Invasion' Scrap Pipe Used As Storage Space

Scrap pipe is put to good use in Ballinger, Texas, where Lone Star Gas Co. warehouse space is at a premium. Using scrap 6- and 12-in. pipe, workmen devised the above pipe rack. Top three sections are of 6-in. invasion pipe, bottom three are 12-in.

The rack will hold 600 ft of 1¼-in. pipe, over 300 ft of 1-in., 300 ft of ¾-in. and 400 ft of ½-in. Placed on cross pieces of 1-in. pipe, the rack has swing gates which can be closed over the end and padlocked. The gates were necessary because of the narrow alley in which the rack must be used. Pipe being removed is swung out and sidewise. Gates are welded to angle iron, set vertically and hinged to the rack. Gate ends are made of boiler plate.



Windows or slots cut in each rack section enable workman to see what pipe inventory is and also to push short sections out. Rack is 21½ ft long.

## DIGESTS continued

excise tax legislation without some provision being made to make up for this loss of revenue was out of the question. However, while we believed that this condition would prevail, we could not abate our efforts nor ease our vigilance for fear that some piece-meal repeal measure would be acted upon and we would find our manufacturers left out in the cold.

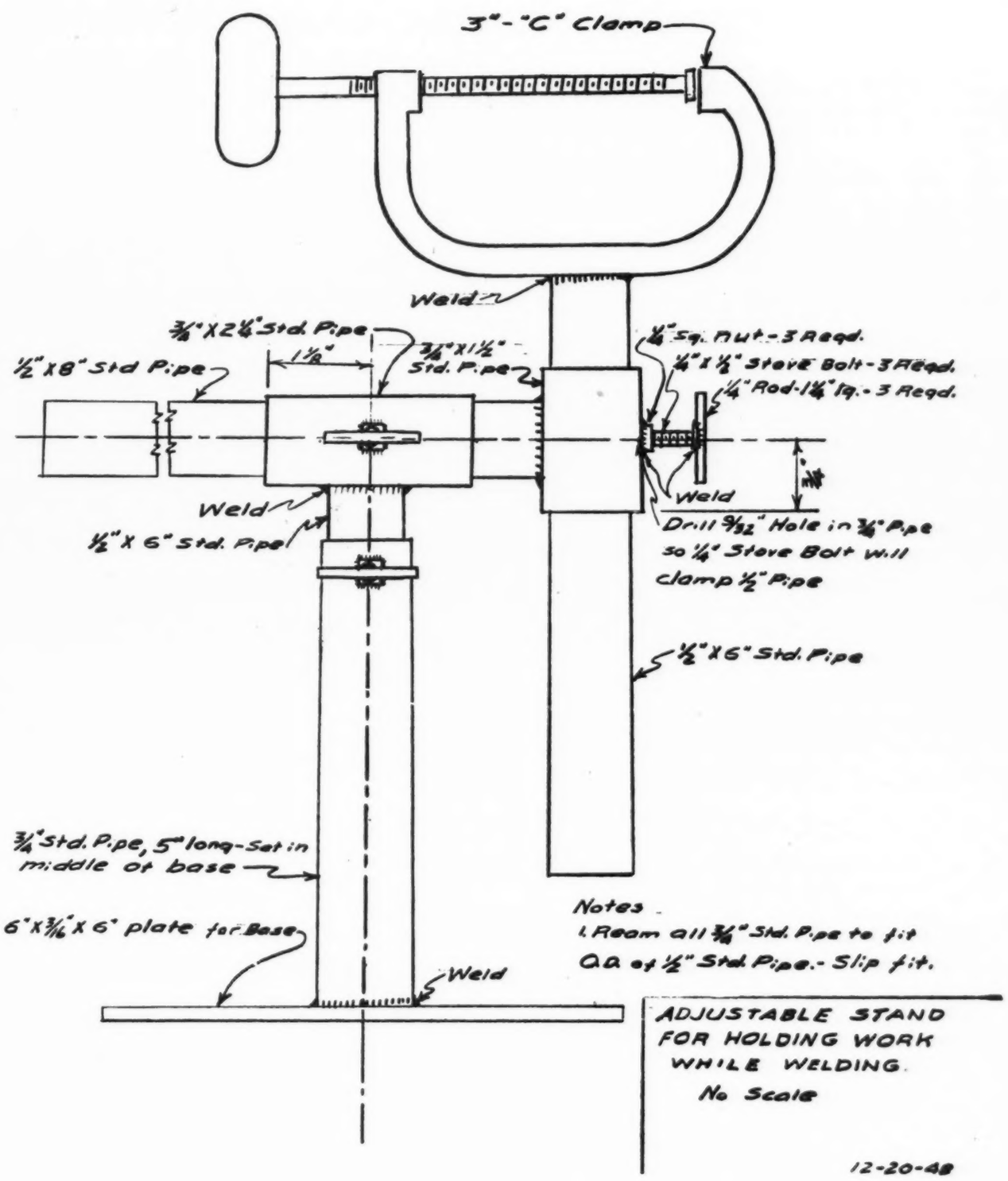
The big danger if such action occurred is one which we have confronted for some time. Namely, the longer excise taxes remain as part of our federal method of obtaining revenue, the more remote are the possibilities of having them eliminated, or at least reduced to offset discrimination.

We will have to continue our educational campaign through this year and next year, if necessary, and in fact until we have accomplished our purpose and the industry has attained some measure of relief.

Most observers of the Washington scene are convinced that excise tax relief will be put off until 1950, an election year, unless business conditions suddenly drop to a level which might jar shocks of a further depression. Repeal of the excise tax without some compensating adjustment in revenue-producing legislation, does not appear as part of the pattern of the administration's tax program.

The alternatives are reduction of government spending, either through economies of operation or through curtailment of funds for foreign countries. If this can be accomplished to a point where the loss of revenue from excise taxes is offset, we can hope for complete elimination.. If not, then a proposal will probably be submitted to equalize the excise tax at some lower rate, eliminate discriminations, and provide other methods of raising revenue.

## WELDING STAND

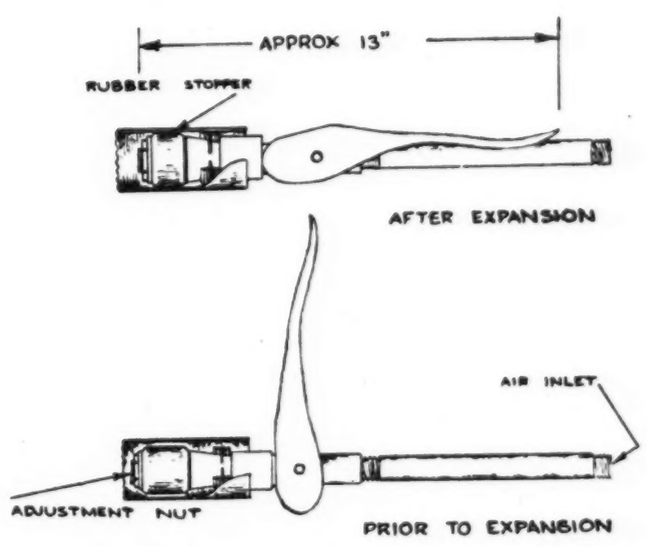

3"-"C" Clamp
Weld
3/16"X2¼" Std. Pipe
1½"
3/16"X1½" Std. P.pe
½"X8" Std Pipe
¼" Sq. Nut-3 Reqd.
¼"X1½" Stove Bolt-3 Reqd.
¼" Rod-1¼" lg.-3 Reqd.
Weld
Weld
½"X 6" Std. Pipe
Drill 9/32" Hole in 3/16" P.pe so ¼" Stove Bolt will clamp ½" Pipe
½"X6" Std. Pipe
¾" Std. P.pe, 5" long-Set in middle of base
6"X3/16"X6" plate for Base
Weld
Notes
1. Ream all 3/16" Std. P.pe to fit OD of ½" Std. Pipe.- Slip fit.
ADJUSTABLE STAND FOR HOLDING WORK WHILE WELDING.
No Scale
12-20-48

**Stand, the invention of W. W. Osborn, Panhandle Eastern PipeLine Co., holds work for welding in any desired position. Use of two stands in conjunction permits joining of two sections of pipe or metal at any angle desired. The device is in use at Haven station, where Mr. Osborn is assistant chief engineer.**

## Test Head For Quick Application

O. F. Anderson of Coast Counties Gas and Electric Co. designed the illustrated test head for quick application and safety. The stopper is easy to operate, requires no tools for installation and has shown a considerable saving over the Rolla-Grip and capping methods of plugging a main for a stand-up test.

The stopper is inserted in the end of the pipe section and the handle is pulled down. The latter operation expands the rubber stopper and sets the dogs. The head is designed so that increasing main pressure makes the head hold more tightly. Should a man start to release the test head before the main pressure has been reduced to zero, he is warned by the escaping air but the pressure holds the head on.




The test heads have been tested at 500 psi air pressure without evidence of leakage or other failure.

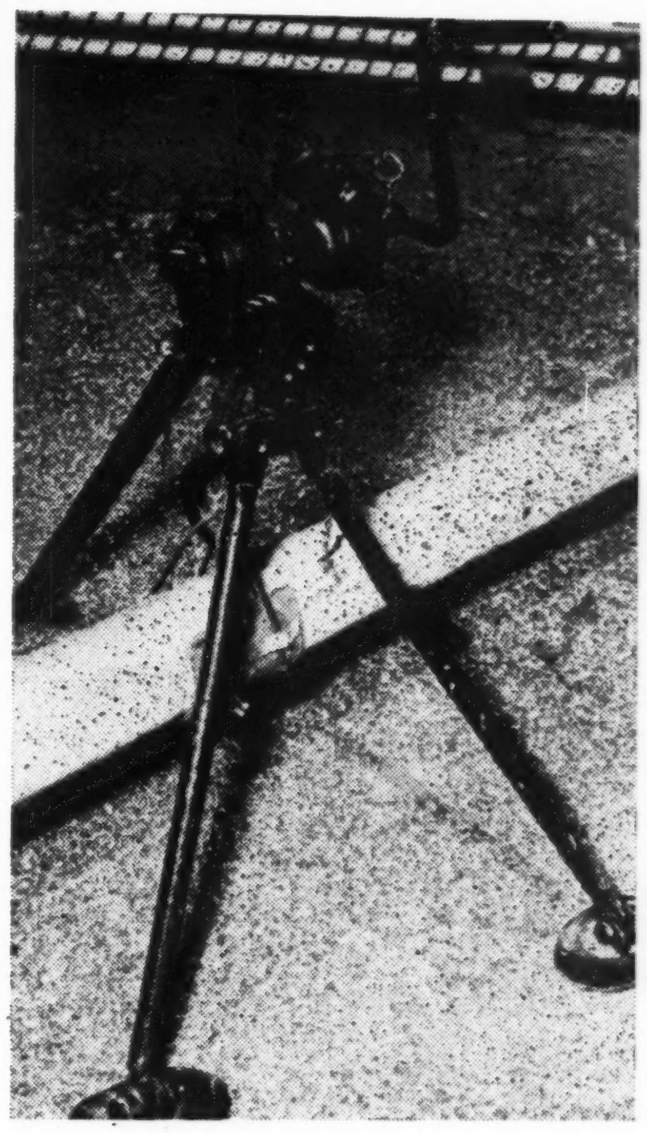
The only time check that has been taken was made on a 3000-ft installation of 3-inch main in Santa Cruz, Calif. This showed a saving of seven man hours under the Rolla-Grip time.

*(Excerpt of paper presented by J. R. Rensch at PCGA distribution conference.)*

## Simple Hoist Has Many Uses

Photo shows a simple pipe hoist that is collapsible and light enough to be carried by one man. The trial model has a winch built from a Dodge steering gear that locks in position with a pin stop. The span of the tripod legs is adjustable; thus the hoist can straddle varied trench widths.

The hoist is used for lifting pipe off skids and lowering it into the



trench. Four-inch pipe strings are easily lowered and 6-in. pipe has been lowered with the little 3-ft hoist. The lift has also been found to be useful in lifting pipe for soap testing and wrapping. The middle of a joint is lifted and the two adjacent welds can be tested and wrapped.

Future developments will include designing the hoist for minimum weight, and selection of an ideal winch.

*(Excerpt of a paper presented by J. R. Rensch, regional gas engineer, Coast Counties Gas & Electric Co., Concord, Calif., at the PCGA distribution conference in Los Angeles in April.)*

# San Diego Readies Propane Standby For Coming Winter Emergencies

By BILL CLARK

THAT a critical shortage of gas such as was experienced by San Diego Gas & Electric Co. during the bitterly cold snap in southern California last winter* won't happen again is being assured this summer through a two-way construction program: a new source of natural gas through a 16-in. takeoff from the Texas-California line and a million-dollar propane-air standby plant.

Exclusive

Instead of a 50-MMcf per day peak load capacity (33 MMcf from an existing natural gas pipeline and 17 MMcf from a manufactured gas plant, now being retired), the company will have a total supply of about 70 MMcf from the two lines. The new propane-air plant, which is capable of producing an equivalent of 1500 Mcf per hour of 1050-Btu gas, will be only standby. Projecting the load ahead several years, it is estimated that by winter season, 1952-53, peak demand may reach 69.7 MMcf, so the 70 MMcf natural gas capacity will still be sufficient.

Thus the standby will provide a safe cushion, probably going into service only in case of a failure in one of the two transmission lines. If called upon, it will be able to produce sufficient propane-air to pinch hit for either line for more than two days, with present storage. That is, at full load, it will be capable of producing for a 57-hour stretch, which should give the company ample time to get a line back into service again.

About 1 million gal can be stored in the 36 x 30,000-gal tanks which comprise the "tank farm." These tanks are already in place and are being filled during the summer months, when the price of the fuel is at its lowest—and transportation facilities are more readily available. The farm, whose half-billion-dollar cost accounts for about one-half of the total cost of the plant, is one of the largest on the west coast.

Half of the storage vessels were fabricated by American Pipe and Steel Corp., Alhambra, Calif., the other half by Consolidated Western Steel in its San Francisco plant.

Unloading facilities as constructed permit two tankers consisting of truck and trailer, with a capacity of 6500 to 7000 gal per combined tanker unit, to inject fuel into the tanks simultaneously.

The plant's producing capacity is 1125 Mcf per hour of 1400-Btu gas-air, equivalent to the 1500 Mcf of 1050-Btu gas mentioned above. To produce at this rate, 17,190 gal of liquid propane per hour is withdrawn.

To make the gas completely interchangeable with natural, 501 Mcf per hour of air is required. This is furnished by two 900-hp Worthington electrically driven air compressors. Although this type of drive is not standard in most compression jobs where gas is available, the fact that the plant is located adjacent to one of the company's own substations swayed the company in favor of electricity.

Furthermore, from a non-operating maintenance standpoint—and the plant will seldom be in operation—this type of equipment was felt to be economical.

In the mixing process, propane liquid will first be drawn from the tank farm for vaporization in a horizontal shell and tube with a reboiler type of heat exchanger. Low-pressure steam will be used to supply the heat of vaporization, 15,000 lb of steam per hour, supplied by two low pressure (15-lb) boilers, being required. The steam will be totally condensed in the heat exchanger and returned from there to the boilers.

*Joseph, James, *GAS*, May, 1949, p. 108.

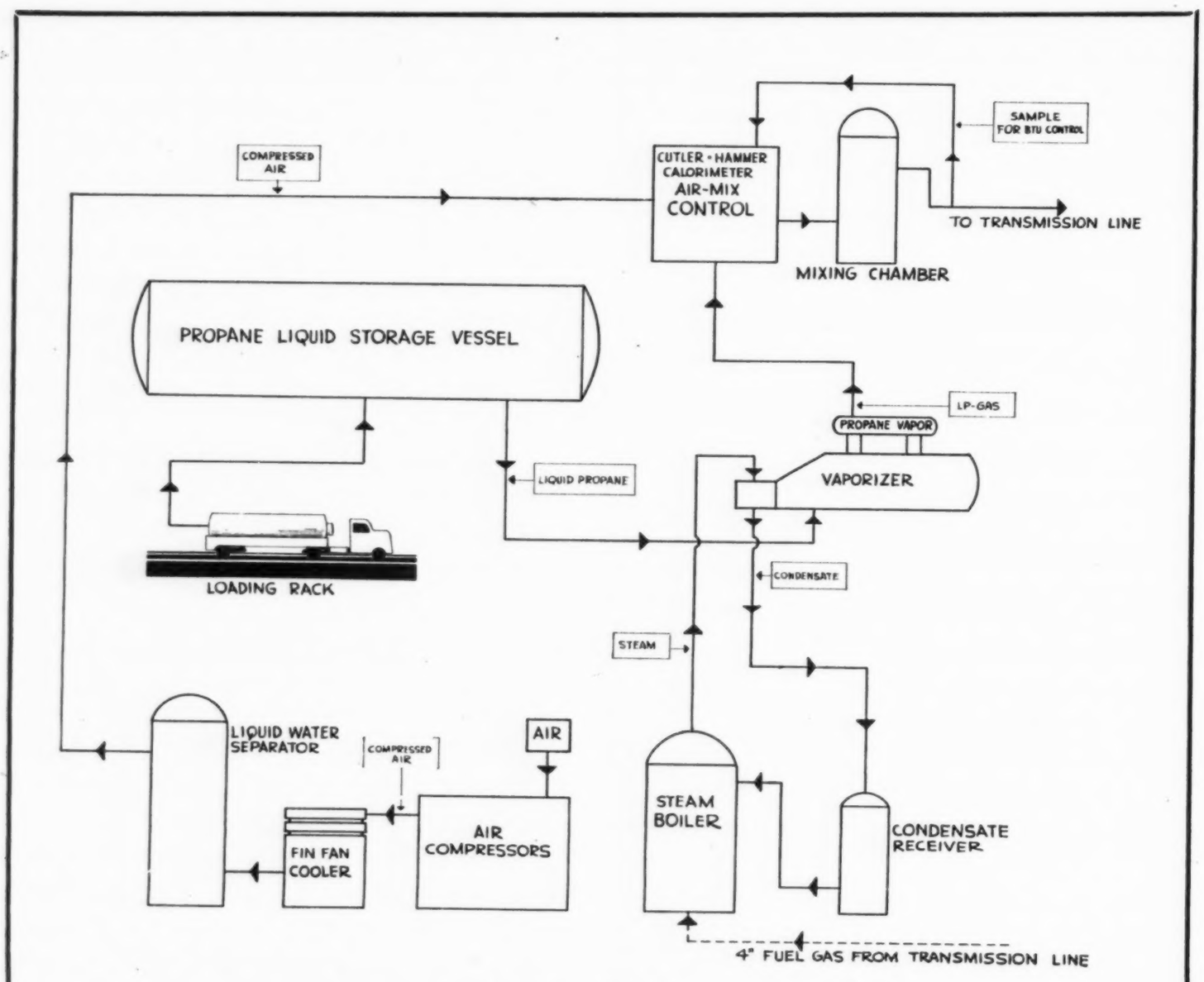



**Fig. 1. Flow chart of San Diego propane-air plant.**

9 ★ Complete Financial

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# INSTALLATION OF NEW LPG STANDBY PLANT

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## Wins

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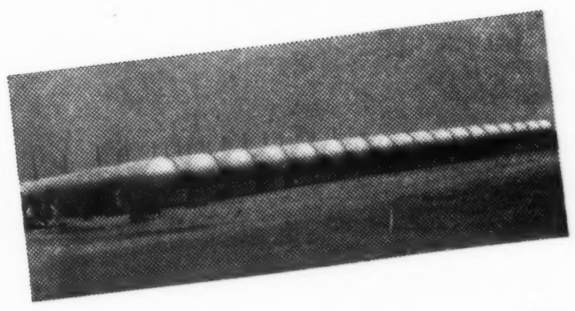
# AMERICAN Bulk Storage Tanks
## for San Diego Gas & Electric Company's new emergency standby plant



American Bulk Storage Tanks are precision-constructed to API-ASME or ASME codes by craftsmen with over 40 years of experience. They offer you maximum efficiency, economy, dependability. Standard sizes from 2,410 to 31,610-gal. capacity to fit your need for standby facilities, gas-enrichment or both. Our storage engineers are as close as your nearest telephone. Write, wire or telephone today.

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**AMERICAN PIPE & STEEL CORPORATION**

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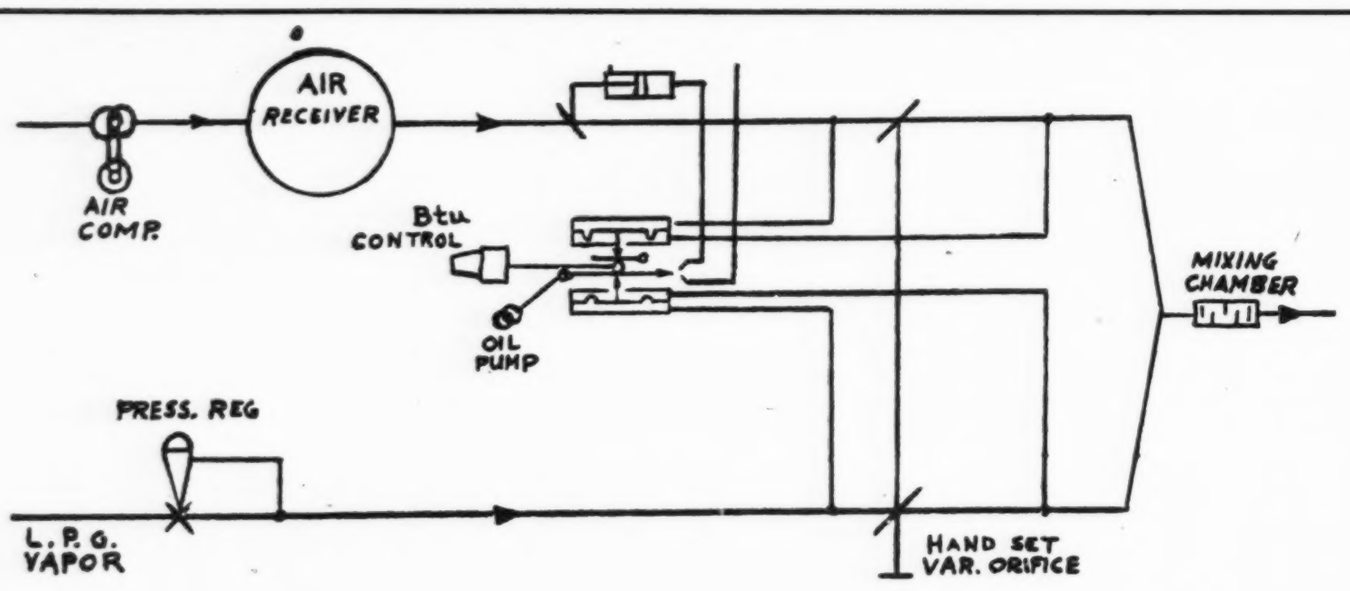



**Fig. 2. Compressor type, high-pressure mixing control, using hand set orifices and unit ratio controller.**

The vaporized propane gas will be taken to the mixer, where accurate control will assure a properly interchangeable mixture. A Cutler-Hammer circuit will gage the mixture, controlling the ratio through accurate heat measurement. According to engineers at Parkhill-Wade, Los Angeles, which designed the San Diego plant, this type of control is relatively new to the West Coast. Standard with most LP-Gas-air plants in the region are the volume and displacement types of control.

### C-H System

In the C-H system, the air mixture is controlled and recorded through a calorimeter controller. A sample of air mix is continuously burned in a calorimeter recorder which actuates a calorimixer Btu adjuster, which in turn automatically changes the ratio of gas and air to hold it to a constant heating value. A diagrammatic sketch is shown in *Fig. 1*.

Gas-air leaves the machine at 125 psi, which is near the safe maximum. At higher pressures liquid propane might be condensed out of the mixture at prevailing line temperatures. At 125 psi, the dewpoint will be 35°F, which is well below operating line temperatures which seldom drop as low as 45° in the system.

### Safety Is Assured

Ample provisons have been made to assure safety in operation. The plant is located in an isolated area about 7 or 8 miles inland from the ocean, and several miles from the city of San Diego. Being on the right-of-way of the Biggest Inch lateral supplying gas to the city and its suburbs, the plant can inject propane-air almost directly into the big transmission line.

A single remote control point at the plant fence line will provide simultaneous shutoff of all liquid lines. Vaporizing and air-mix facilities are completely automatic, as is the boiler plant. Compressors have automatic unloading of cylinders to meet varying load demands.

When in operation, the plant will require the services of only one to two men. During the remainder of the year, except for periodic inspections and tests, no manpower will be needed.

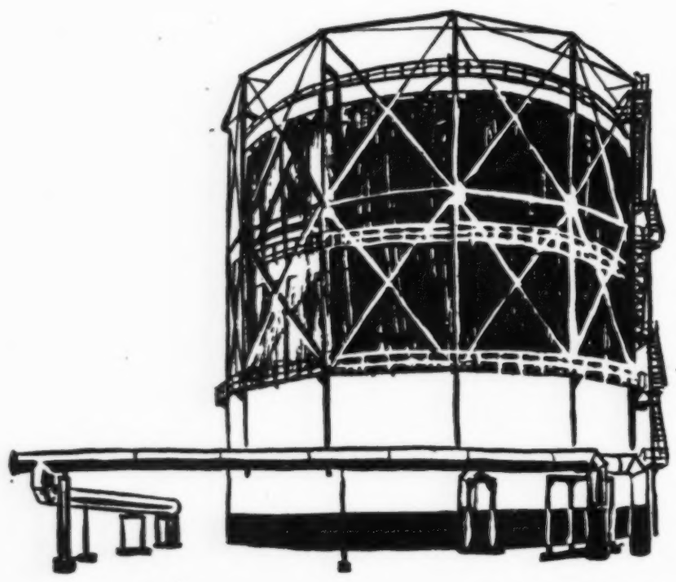
### Why Propane-Air?

Construction of the plant has been done by San Diego Gas & Electric Co. personnel, working from designs drafted by Parkhill-Wade.

Why did the company select propane-air for standby?

It was the only logical solution. Interchangeability troubles with the old manufactured standby plant were manifold last winter when it had to be pressed into service for extended periods. (Incidentally, although it's being retired, it won't be dismantled until both the new line and the propane-air plant are ready for service. Both should be ready well ahead of any cold snap.)

Storage of natural gas on a scale comparable with the present 36 30,000-gal tanks would be practically impossible. Geological study of underground structures has thus far failed to find suitable locations to hold such volumes. The 1 million gal of propane is equivalent in heat content to 92 MMcf of gas, so holders of sufficient capacity are out of the question.



*Butane-Propane*

## LP-Gas Sales Continued Rapid Growth in 1948

**Sales of liquefied petroleum gas in 1948 showed a continuation of the rapid growth that has marked the industry for the past decade, a recently released study by the Bureau of Mines, U. S. Department of the Interior, shows.**

**Sales of 2,736,801,000 gal during the year zoomed 23.8% over the 1947 total, 2,209,797,000 gal. This increase alone was larger than the entire sales of the industry in 1941. Butane-propane exports fell off slightly in 1948, however.**

**Charts on this page, taken from the Bureau of Mines report, amplify the estimated figures contained in the year-end report by K. W. Rugh and E. O. Mattocks (*GAS*, January, p. 35). This year, for the first time, the bureau has broken down the national sales of LP-Gas into five geographical districts and has shown within those districts the percentages and volumes of gas sold. The report also provides the first complete breakdown by principal uses.**

**It will be noted that states comprising District 3, where the largest proportion of LP-Gas was marketed, accounted for 1,122,800,000 gal or 41% of the national sales. District 2 was second with 778,-142,000 gal, or 28.8%.**

**LP-Gas sold for domestic and commercial purposes comprised 53.8% of the total amount in 1948, and represents a 28.1% increase over totals sold for the same purposes in 1947.**

**Largest relative increase in domestic sales in 1948 was amassed by butane, of which 113,001,000 gal were sold, a whopping 82% increase over the amount of butane sold in 1947 (62,092,000 gal). Propane, however, had a big 52.1% increase during the year. Mixtures of butane and propane accounted for but a 1.6% increase, with a total sales figure of 594,335,000 gal.**

## TABLE 1. SALES OF LIQUEFIED PETROLEUM GASES IN THE UNITED STATES

(Thousands of Gallons)

| Year | Butane | Percent of Total | Propane | Percent of Total | Butane-Propane Mixture | Percent of Total | Total LP-Gas | Per-cent | Percentage Change from Previous Year |
|---|---|---|---|---|---|---|---|---|---|
| 1944 | 273,116 | 25.8 | 335,884 | 31.7 | 451,156 | 42.5 | 1,060,156 | 100.0 | ..... |
| 1945 | 325,140 | 25.5 | 444,581 | 34.8 | 507,045 | 39.7 | 1,276,766 | 100.0 | 20.4 |
| 1946 | 441,418 | 25.9 | 551,250 | 32.3 | 711,594 | 41.8 | 1,704,262 | 100.0 | 33.5 |
| 1947 | 398,635 | 18.0 | 863,686 | 39.1 | 947,476 | 42.9 | 2,209,797 | 100.0 | 29.7 |
| 1948 | 512,615 | 18.7 | 1,279,744 | 46.8 | 944,442 | 34.5 | 2,736,801 | 100.0 | 23.8 |

## TABLE 2. TRENDS IN THE SALES OF LP-GAS BY PRINCIPAL USES

(Thousands of Gallons)

| Year | Domestic | Chemical | Synthetic Rubber | Industrial | Gas Mfg. | Internal Combustion | All Other | Total |
|---|---|---|---|---|---|---|---|---|
| 1944 | 445,617 | 151,985 | 162,085 | 162,018 | 45,879 | 92,495 | 77 | 1,060,156 |
| 1945 | 533,262 | 224,291 | 208,787 | 163,121 | 53,849 | 93,340 | 116 | 1,276,766 |
| 1946 | 758,466 | 311,499 | 293,892 | 159,115 | 86,660 | 94,592 | 38 | 1,704,262 |
| 1947 | 1,150,538 | 414,267 | 201,535 | 173,601 | 169,332 | 99,786 | 738 | 2,209,797 |
| 1948 | 1,473,289 | 490,964 | 225,641 | 213,904 | 237,638 | 92,941 | 2,424 | 2,736,801 |

## TABLE 3. SALES OF LIQUEFIED PETROLEUM GASES IN 1948

(Thousands of Gallons)

| Principal Uses | Distribution by Districts* | | | | | Total Sales | | Percent Change 1948 to 1947 |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1948 | 1947 | |
| **Butane** | | | | | | | | |
| Domestic and Commercial | 17,159 | 22,419 | 58,986 | 7,595 | 6,842 | 113,001 | 62,092 | 82.0 |
| Gas Manufacturing | 20,521 | 36,445 | 2,206 | 2,588 | 1,812 | 63,572 | 58,424 | 8.8 |
| Industrial Plants | 7,042 | 43,414 | 13,352 | ..... | 2,678 | 66,486 | 61,901 | 7.4 |
| Synthetic Rubber | 563 | 19,311 | 159,197 | ..... | 15,706 | 194,777 | 187,733 | 3.8 |
| Chemical Plants | 178 | ..... | 44,005 | ..... | 10,203 | 54,386 | 18,796 | 189.3 |
| Internal Combustion | 380 | 16,491 | 49 | 6 | 3,093 | 20,019 | 9,662 | 107.2 |
| All Other Uses | 1 | 54 | 319 | ..... | ..... | 374 | 27 | 1285.2 |
| TOTAL Butane Sales | 45,844 | 138,134 | 278,114 | 10,189 | 40,334 | 512,615 | 398,635 | 28.6 |
| **Propane** | | | | | | | | |
| Domestic and Commercial | 193,515 | 317,068 | 138,260 | 28,643 | 88,467 | 765,953 | 503,448 | 52.1 |
| Gas Manufacturing | 45,156 | 69,890 | 1,802 | ..... | 16,227 | 133,075 | 77,110 | 72.6 |
| Industrial Plants | 48,135 | 40,095 | 12,270 | 1,033 | 10,757 | 112,290 | 83,108 | 35.1 |
| Synthetic Rubber | 870 | 1,267 | 785 | ..... | 1,203 | 4,125 | 4,558 | —9.5 |
| Chemical Plants | 4,915 | 785 | 209,256 | ..... | 34,697 | 249,653 | 182,388 | 36.9 |
| Internal Combustion | 52 | 7,514 | 1,004 | 41 | 5,521 | 14,132 | 12,595 | 12.2 |
| All Other Uses | 283 | 232 | 1 | ..... | ..... | 516 | 479 | 7.7 |
| TOTAL Propane Sales | 292,926 | 436,851 | 363,378 | 29,717 | 156,872 | 1,279,744 | 863,686 | 48.2 |
| **Butane-Propane Mixture** | | | | | | | | |
| Domestic and Commercial | 35,670 | 119,667 | 351,852 | 4,325 | 82,821 | 594,335 | 584,998 | 1.6 |
| Gas Manufacturing | 3,906 | 20,990 | 3,775 | 1,243 | 11,077 | 40,991 | 33,798 | 21.3 |
| Industrial Plants | 1,336 | 8,785 | 11,156 | ..... | 13,851 | 35,128 | 28,592 | 22.9 |
| Synthetic Rubber | ..... | 2 | 26,737 | ..... | ..... | 26,739 | 9,244 | 189.3 |
| Chemical Plants | 74,873 | 44,706 | 67,346 | ..... | ..... | 186,925 | 213,083 | —12.3 |
| Internal Combustion | ..... | 18,754 | 19,231 | 453 | 20,352 | 58,790 | 77,529 | —24.2 |
| All Other Uses | ..... | 253 | 1,281 | ..... | ..... | 1,534 | 232 | 561.2 |
| TOTAL B-P Mixture Sales | 115,785 | 213,157 | 481,378 | 6,021 | 128,101 | 944,442 | 947,476 | —0.3 |
| **Total LP-Gas** | | | | | | | | |
| Domestic and Commercial | 246,344 | 459,154 | 549,098 | 40,563 | 178,130 | 1,473,289 | 1,150,538 | 28.1 |
| Gas Manufacturing | 69,583 | 127,325 | 7,783 | 3,831 | 29,116 | 237,638 | 169,332 | 40.3 |
| Industrial Plants | 56,513 | 92,294 | 36,778 | 1,033 | 27,286 | 213,904 | 173,601 | 23.2 |
| Synthetic Rubber | 1,433 | 20,580 | 186,719 | ..... | 16,909 | 225,641 | 201,535 | 12.0 |
| Chemical Plants | 79,966 | 45,491 | 320,607 | ..... | 44,900 | 490,964 | 414,267 | 18.5 |
| Internal Combustion | 432 | 42,759 | 20,284 | 500 | 28,966 | 92,941 | 99,786 | —6.9 |
| All Other Uses | 284 | 539 | 1,601 | ..... | ..... | 2,424 | 738 | 228.5 |
| TOTAL U. S. Sales | 454,555 | 788,142 | 1,122,870 | 45,927 | 325,307 | 2,736,801 | 2,209,797 | 23.8 |
| Exports | | | | | | 45,520 | 53,233 | —14.5 |
| GRAND TOTAL Sales | | | | | | 2,782,321 | 2,263,030 | 22.9 |

*District 1: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida. District 2, North Dakota, South Dakota, Minnesota, Nebraska, Iowa, Wisconsin, Illinois, Indiana, Michigan, Ohio, Kentucky, Tennessee, Missouri, Kansas, Oklahoma. District 3: New Mexico, Texas, Arkansas, Louisiana, Mississippi, Alabama. District 4: Idaho, Montana, Wyoming, Utah, Colorado. District 5: California, Oregon, Washington, Arizona, Nevada.

# Manufacturer, Utility, Dealer Join Forces to Build Gas Heating Load

THAT LITTLE SEAL which appears at left may one day be as familiar to southern California housewives as the CP and AGA symbols have now become on a nation-wide scale, if prominent gas heating equipment manufacturers, distributors, contractors, and the two utilities in the area have their way.

Here, briefly, is what it stands for:

1. Complete safety through strict compliance with laws and ordinances.
2. Conformity with standards established by recognized engineering authorities to assure adequate heating facilities.
3. Workmanlike and efficient installations.
4. Strict observance of manufacturers' warranties.
5. Uniformity in standards of service.

More specifically, it stands for the Institute of Gas Heating Industries Inc., a growing association of 100 firms in the area who are devoting a good share of their energies to the mutual benefit of customer, manufacturer, seller, and utility. Under the managing directorship of Ernest W. Kimmell, a retired utility man whose years with Pacific Gas & Electric Co. as a dealer representative in the Oakland office gave him the requisite savvy on utility-dealer-customer relationship problems, the institute numbers among its biggest member-boosters Ward Heater Co., Day & Night, Payne, Southern California Gas Co., Pacific Coast Gas Assn., as well as dozens of others.

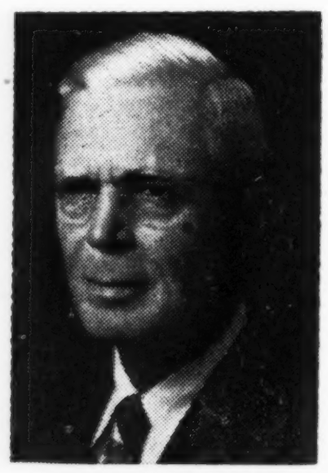
### Action Programs

What's behind the goals of the institute? Is its "code of ethics" which embodies in principle the five points listed above—and others—just pretty words? Indeed no. The institute is backing up its creed with concrete programs of action. Take, for example, two: municipal code improvement and education of its members.

This year witnessed the inauguration of the training classes. A three-section school has been and is being set up, and the "C Section" has already held its initial course. Consisting of 12 two-hour weekly sessions, it drew 125 enrollees with an average attendance of about 80. The "A Section," an annual event, is billed for the fall months, and the "B Section" is still in the formative stage.

The sections are tailored for separate groups within the industry, although the emphasis is upon the personnel of dealer and contractor companies. C Section is a gas heating engineering school designed for the upper brackets among member companies. Prepared under the general supervision of R. C. Terradell, SoCal sales training supervisor, and programmed by Tom Pinatelli, Hammel Heating Co., it gave a general picture of the operation of the natural gas industry from well-head to customer. Mickey O'Haver, SoCal dealer-appliance sales head, was one of the promoters of the school, and particular credit should go to the men in the utility's sales training department.

**Walter R. Dicus**
*. . . president*



**E. W. Kimmell**
*. . . director*

The A Section, "Installers Training," will be aimed straight at the man in overalls. Don Kirtley, formerly training expert at SoCal and now with Holly Manufacturing Co., is chairman. R. D. MacMahon, SoCal Gas, is one of the motivators.

B Section is "Business Administration," and is being built around the idea that by improving, streamlining, simplifying, and clarifying business recording methods of (principally) dealers, failures caused by inept accounting can be avoided. Proper costing will be strongly emphasized. In constructing the course, the institute appropriated $1000 for a survey now being made by a firm of accountants to investigate practices prevailing in the area, both good and not so good.

Codes in Los Angeles and its satellites pose a real headache. Each has faults, and no two are alike. Firms doing business in more than one city, which is fairly common since they run together in many instances, need Philadelphia lawyers to keep the different regulations straight. The situation is a constant source of worry to the utility as well as dealers, as it holds franchises in many cities in the area. Nor are the manufacturers happy.

It is the institute's aim to rewrite heating codes, or assist in their revision—and above all, to make them as nearly uniform as possible. Its first and foremost objective is the city of Los Angeles, and the institute's active code committee has completed a set of recommendations which has received the approval of the "Heating Code Advisory Committee of Los Angeles," an independent group. Glenn A. Ashburn, chairman of the code committee of the institute, is also chairman of the advisory committee, and E. W. Kimmell acts as executive secretary. These proposed changes have been submitted to the city of Los Angeles and they in turn have a code advisory committee in which the institute as well as ASHVE, the chamber of commerce, the utility, and many other organizations are represented. These recommendations will shortly be before the city council for their final approval.

### "Guinea Pig" for Codes

The institute is already beginning to extend its field action in code revision. A new ordinance is being worked up for the city of Santa Monica, which is to be a "guinea pig" in the institute's plan to stimulate code revision throughout southern California.

Codes and schools are only part of the picture. Promotion of the use of the seal in advertising and display is being sparked by a publicity and advertising committee, and a "use of the seal" monthly contest among members is getting under way. Membership in the heating contractors license board of Los Angeles and the city's emergency committee assures an active part in their activities. A monthly news letter is in production and a periodic digest of leading magazine articles is in the works. A group insurance plan to benefit employees is also in the formative stage.

The institute was formed in 1940, but the war held a rein on its real growth. Copyrighting of the seal and incorporation as a non-profit organization have helped to give it a boost in the right direction.

Southern California, with a large share of the nation's appliance manufacturers, needed an organization to coordinate its gas heating industries. The institute is filling that need.

# what's wrong with this picture?

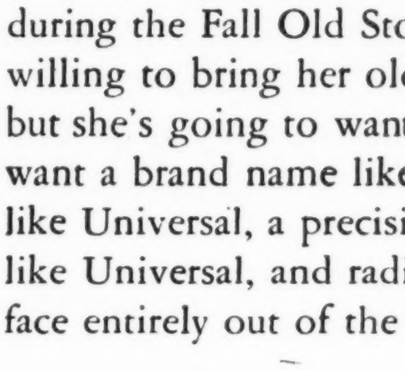
NOTHING . . . except that Friend Squaw won't have to carry her old range in to you dealers. *You* are going to pick it up for her and install a brand new *Universal Gas Range* right into her wigwam.

Seriously, Mr. Dealer, could you do better than to offer one of the many different Universals to Mrs. American Homemaker during the Fall Old Stove Round-Up? She may not be as willing to bring her old range to you as the lady in the picture, but she's going to want modern excellence. She's going to want a brand name like Universal, top burner efficiency like Universal, a precision oven that bakes and roasts like Universal, and radiant broiling, with her hands and face entirely out of the heat zone, like Universal.

She wants Titanium acid-resisting enamel all over, large surfaces without cracks and corners that collect dirt, and a broiler pan she can clean in 3 minutes.

She wants skyscraper construction and Universal perfection, so that her modern range will last like her old outmoded one. She wants Universal!

***Berkshire Model, with high, separate broiler***



**Fall is Round-Up Time**

Universal offers a complete separate Old Stove Round-Up Campaign package to coordinate with A.G.A.'s National Fall Round-Up. Send to Cribben & Sexton for information.

***A few Dealer Franchises are still available. Write to***

**CRIBBEN & SEXTON**

# *Universal*

**GAS RANGE**

*with Exclusive "Comfort-Touch"*

**CRIBBEN & SEXTON CO., 700 NORTH SACRAMENTO BOULEVARD, CHICAGO 12, ILLINOIS**

# CALENDAR

## OCTOBER

**National Assn. of Corrosion Engineers,** South Central Region—Adolphus hotel, Dallas, Oct. 3-4.

**Southern California Meter Assn. Measurement & Control Instrument Exposition** — Municipal auditorium, Long Beach, Oct. 4-6.

**Oklahoma Utilities Assn. Gas Division**—Biltmore hotel, Oklahoma City, Oct. 7.

**Boston Conference on Distribution** —Hotel Statler, Boston, Oct. 10-11.

**Assn. of National Advertisers** — Waldorf-Astoria, New York, Oct. 10-12.

**American Standards Assn. Annual Meeting**—Waldorf Astoria hotel, New York, Oct. 11-14.

**Texas Mid-Continent Oil & Gas Assn. Annual Meeting** — Rice hotel, Houston, Oct. 13-14.

**American Gas Assn. Annual Convention**—Chicago, Oct. 17-20.

**National Metal Exposition**—Cleveland, Oct. 17-21.

**National Safety Congress**—Morrison hotel, Chicago, Oct. 24-28.

**National Metal Trades Assn.**—Palmer House, Chicago, Oct. 26-28.

**Independent Natural Gas Assn. of America Annual Meeting**—Baker hotel, Dallas, Oct. 31.

## NOVEMBER

**American Petroleum Institute**—Stevens hotel, Chicago, Nov. 7-9.

**National Hotel Exposition**—New York, Nov. 7-11.

**Mid-Southeastern Gas Assn.** — Raleigh, Nov. 10-11.

**Wisconsin Utilities Assn. Annual Meeting**—Milwaukee, Nov. 21-23.

**American Society of Mechanical Engineers Annual Meeting**—New York, Nov. 27-Dec. 2.

**National Personnel Conference of the Gas Industry**—Netherland Plaza hotel, Cincinnati, Nov. 28-29.

## DECEMBER

**The American Society of Refrigerating Engineers Annual Meeting**—Edgewater Beach hotel, Chicago, Dec. 4-7.

## JANUARY

**Southwest Air Conditioning Exposition**—State Fair Grounds, Dallas, Jan. 23-27.

## MARCH

**New England Gas Assn.**—Hotel Statler, Boston, March 23-24.

**Southern Gas Assn.**—Galveston, March 27-29.

## APRIL

**AGA Distribution Motor Vehicle and Corrosion Conference** — Book Cadillac hotel, Detroit, April 3-5.

**AGA Sales Conference of Industrial and Commercial Gas Section**—St. Louis, April 4-6.

**Mid-West Gas Assn.**—Hotel Lowry, St. Paul, April 10-12.

**Southwestern Gas Measurement Short Course**—University of Oklahoma, Norman, April 11-13.

**National Petroleum Assn.**—Hotel Cleveland, Cleveland, April 12-14.

**National Conference of Electric and Gas Utility Accountants**—Brown hotel, Louisville, April 17-19.

**Florida - Georgia Gas Assn. 1950 Business Conference**—Biltmore hotel, Palm Beach, April 20-22.

**Indiana Gas Assn.** — French Lick Springs hotel, French Lick, Ind., April 28-29.

## MAY

**AGA Commercial Gas School**—Cincinnati, May 8-12.

**AGA Gas Production and Chemical Conference**—Hotel New Yorker, New York, May 22-25.

**Gas Appliance Manufacturers Assn. Annual Meeting**—The Greenbrier, White Sulphur Springs, W. Va., May 22-24.

ONE Compact Unit Combines Pressure Regulating Valve, Filter, and Safety Pilot.

- 100% Safe Lighting
- 100% Fail-Safe Operation
- Simplifies Factory Assembly and Field Installation
- Handles ALL Gases
- Reduces Control Costs
- Immediately Adaptable to Automatic Temperature Control
- Quiet

PROTECTED GAS CONTROLS PERFORMANCE

**EASY TO ADD AUTOMATIC TEMPERATURE CONTROL**

A new A-P Thermostatic Heat Regulator Set made especially for the GASAPACK may be supplied at the factory or sold as an easily-installed accessory by your dealer — for extra profit.

**New GASAPACK Model 54 All-In-One Gas Control for Gas Circulating Heaters.**

Here's the Gas Circulating Heater Control that obsoletes all other controls! The new GASAPACK replaces, in a *single* unit, the multiple control set-up usually including an A-cock, B-cock, filter, main valve, pilot valve, and pressure regulator. You have only ONE unit to mount on your heater, only ONE piping connection in the field. You're assured of improved heating efficiency, too. GASAPACK operates positively, noiselessly, holding a constant flame for steady heat. Includes every safety feature for safe lighting and fail-safe operation.

Add this new compact, trouble-free "All-In-One" GASAPACK to *your* gas circulating heaters — for savings and improved customer satisfaction. WRITE TODAY FOR COMPLETE INFORMATION.

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2526 NORTH THIRTY-SECOND STREET
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**DEPENDABLE** *Controls*
FOR HEATING . . . AIR CONDITIONING . . . REFRIGERATION

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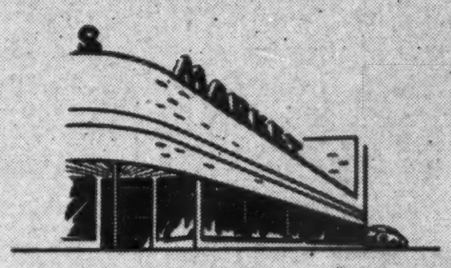
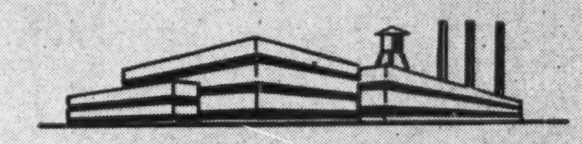
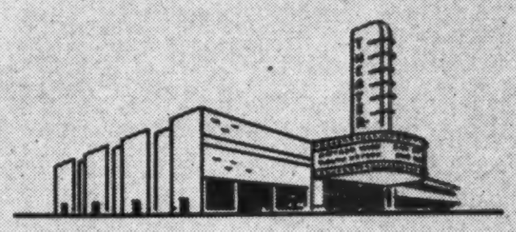


STORES

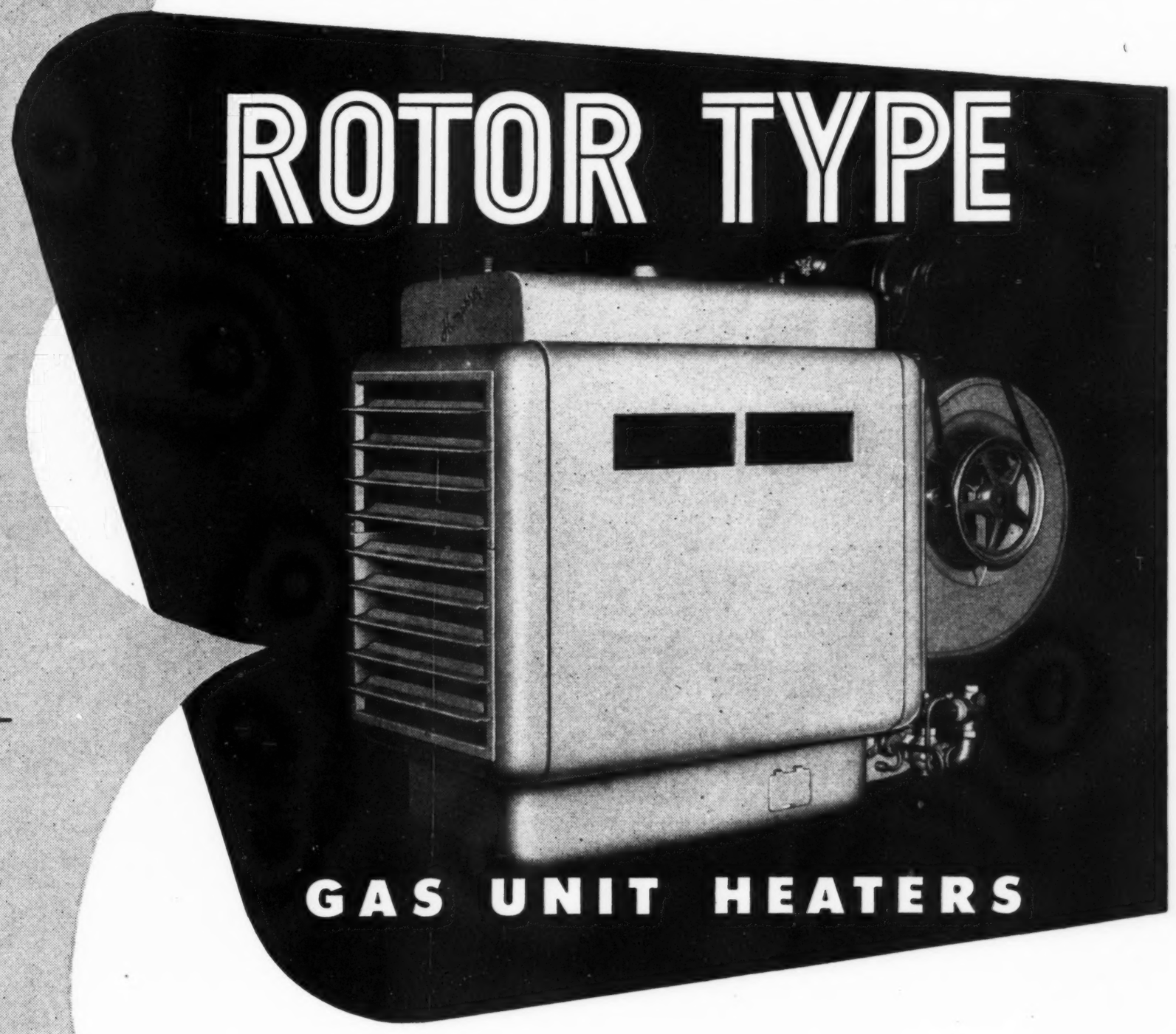
GARAGES



FACTORIES



THEATERS

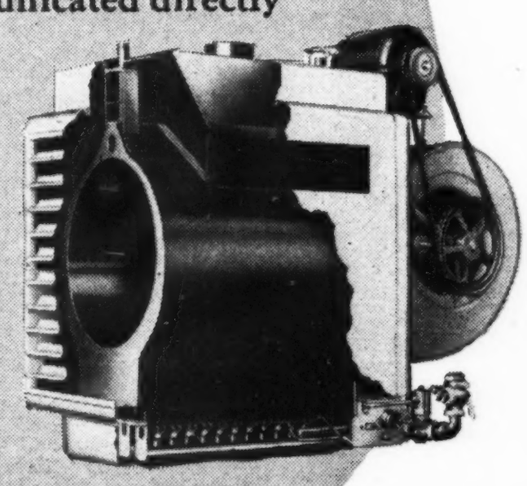



- **NEW Advanced Burner Design**
- **NEW "Free Flow" Heat Exchanger**
- **NEW Positive Safety Controls**
- **NEW Modern Styling and Compactness**

The new Humphrey Rotor Type gas unit heater is the ultimate in a compact, automatic, self-contained heating unit that delivers heat instantly to any point, and yet does not take up valuable floor area.

Installation and operation costs are extremely low . . . no steam or water lines, boilers, firemen. No fuel shortage worries. Maximum heating efficiency is assured in this new Humphrey Rotor Type gas unit heater because it incorporates all the time-tested engineering principles that have made Humphrey heaters famous for half a century, plus sensational improvements and refinements. Write for complete details of this amazingly different gas unit heater.

**RUGGED — COMPACT — EFFICIENT**
Intense heat from the super combustion burner is communicated directly to the famous "Free Flow" heat exchanger, and the heated air is distributed by a powerful blower fan. Equally effective with or without ducts.



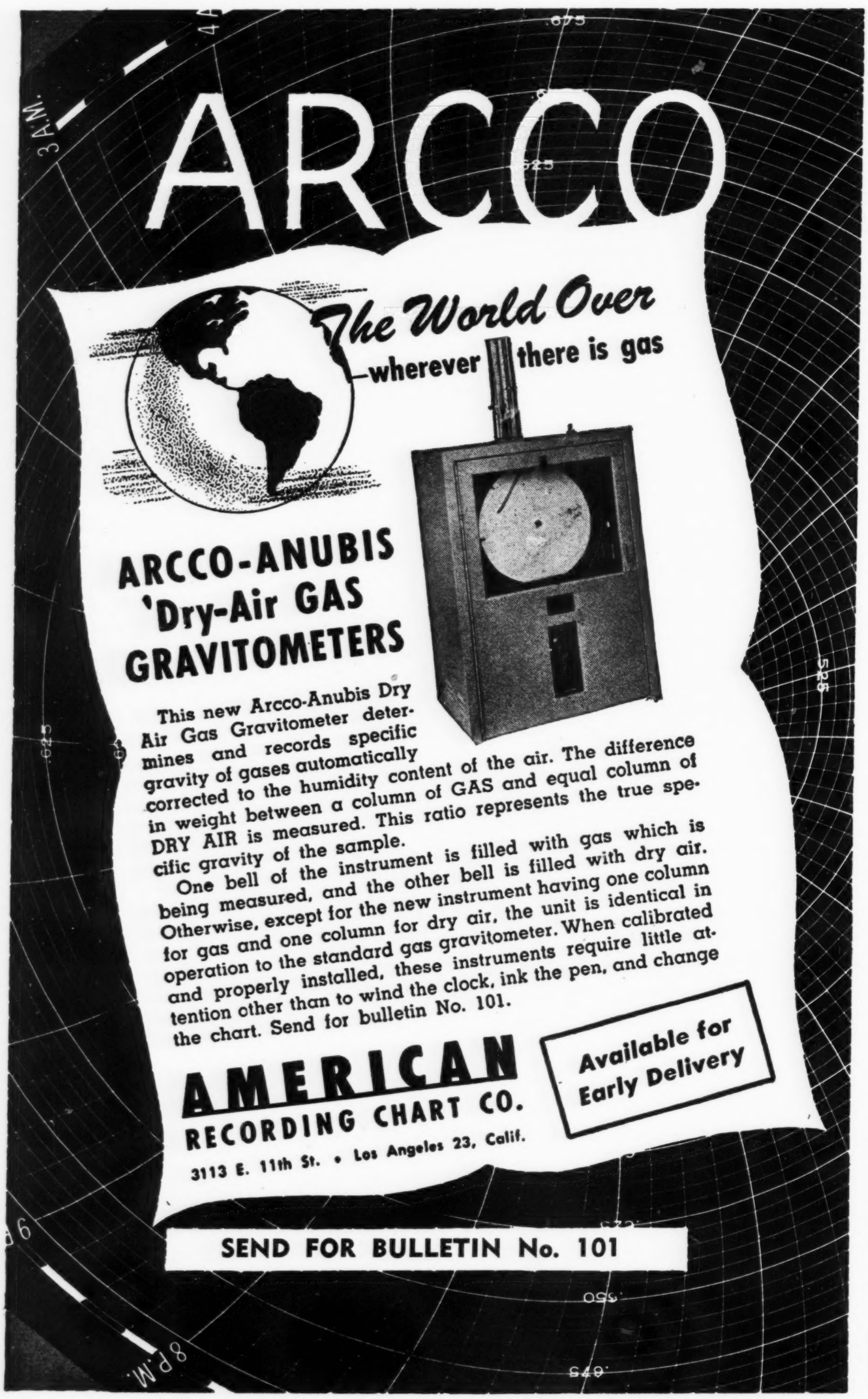
## GENERAL GAS LIGHT COMPANY • KALAMAZOO, MICHIGAN

23 Warren Street, New York City • 2nd Unit Santa Fe Building, Dallas • 225 Eleventh Street, San Francisco

## PCGA continued from page 47

several months ago from the assistant sales managership of Grayson Division, Robertshaw-Fulton, after 17 years in the gas industry, was cited by the commercial cooking division of the association for his long and outstanding service.

Annual awards were distributed as follows: Gold Medal: Harry J. Keeling, SoCal, for his paper on mobile radio communication for gas transmission; R. D. MacMahon, So Cal, for work on the booklet on volume water heating; E. A. Reps, Southern Counties, for paper on his company's new meter repair shop. Authors and papers winning honorable mention: Roy M. Bauer, SoCal, "Practical Use of Gas Storage"; C. M. Croughan and William Harrison, Coast Counties Gas & Electric, "Training Procedures"; H. M. Hoppe, SoCal, "Repairing Large Diameter Cast Iron Mains"; Grove Lawrence, So Cal, "Personnel Aspects of Accident Prevention"; W. A. LaViolette, PG&E, "Better Utilization of Metallic Circuits in Remote Control and Telemetering."


ARCCO
The World Over
wherever there is gas
ARCCO-ANUBIS
'Dry-Air GAS
GRAVITOMETERS
This new Arcco-Anubis Dry Air Gas Gravitometer determines and records specific gravity of gases automatically corrected to the humidity content of the air. The difference in weight between a column of GAS and equal column of DRY AIR is measured. This ratio represents the true specific gravity of the sample.
One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.
Available for Early Delivery
SEND FOR BULLETIN No. 101

## INSTRUMENT EXPOSITION PROGRAM ANNOUNCED

In addition to a series of lectures, five motion pictures of technical interest, and a huge display of measurement and control instruments, attendants at the Measurement and Control Instrument Exposition at Long Beach, Oct. 4-6, will be offered an opportunity to tour three industries plants in the area. Ford Motor Co., Union Oil Co., and Proctor & Gamble have arranged to show their operations to the visitors.

Speakers and their subjects, according to the Southern California Meter Assn., include the following: "Standardization of Design Drafting Symbols," C. S. Beard, Bechtel Corp., San Francisco; "Instrumentation in Rubber Processing," Ralph Brown, Firestone Tire & Rubber Co., South Gate, Calif.; "Variable Area Flow Rate Instruments," Adelbert Carpenter, Fischer-Porter Co., San Francisco; "An Electro-Mechanical Approach to Instrumentation and Control," J. F. Engelberger, Manning, Maxwell & Moore, Bridgeport, Conn.; "Instrumentation in Aeronautical Research and Development," W. F. Ertzman, Northrop Aircraft Inc., Hawthorne, Calif.; "Telemetering and Remote Control," William A. LaViolette, PG&E, San Francisco; "Testing Airborne Temperature Controls," Robert Parks, Northrop; and "Measurement of Heat Radiation and Heat Flow," Louis Possner, University of California, Berkeley.

Admittance to the exposition will be by complimentary tickets which may be obtained from George Forster, SCMA secretary, P. O. Box 320, Long Beach. The municipal auditorium will be open to visitors each day from 1 to 10 p.m.

## MID-WEST GAS SCHOOL

An impressive list of prominent gasmen from all sections of the country addressed the 26th Mid-West Gas School and Conference last month. The event was held Sept. 6-8 at Iowa State College, Ames, under joint auspices of the Mid-West Gas Assn. and the college.

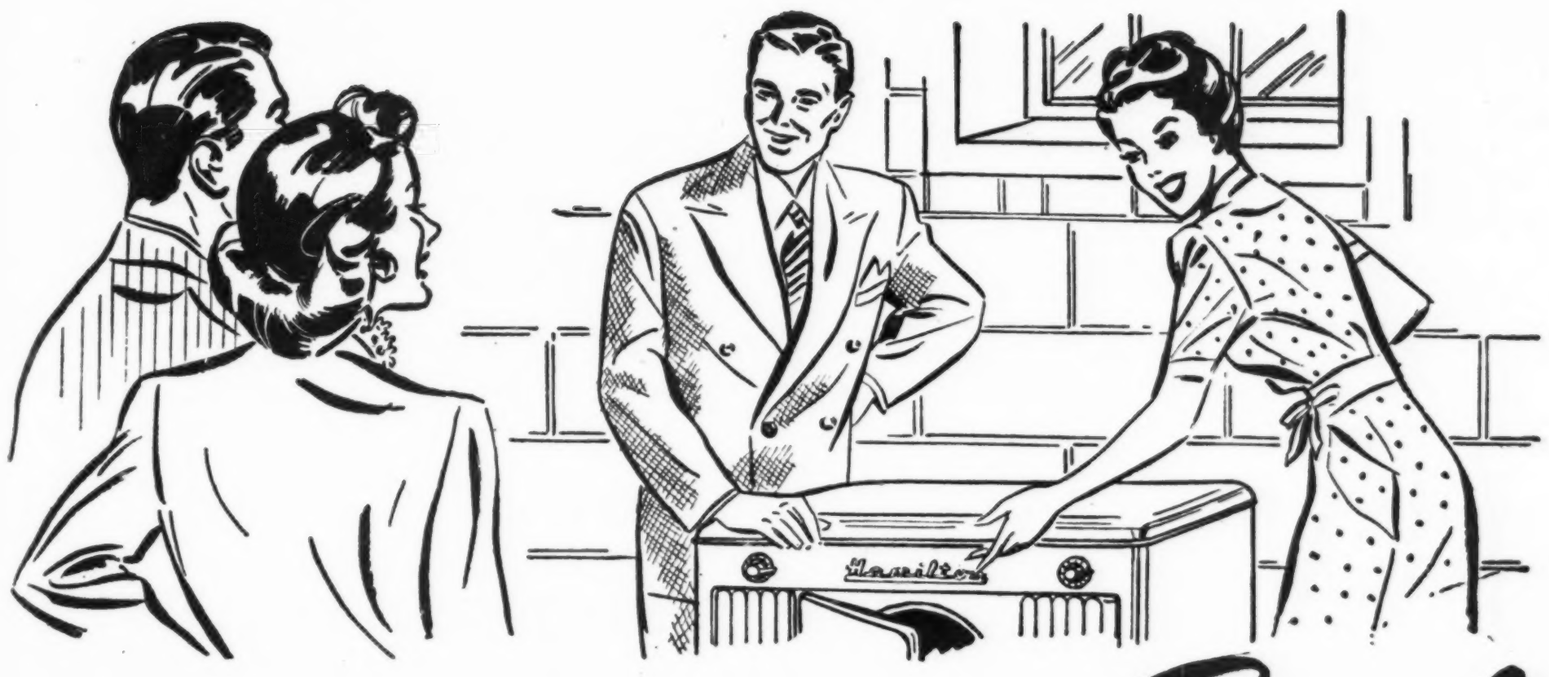
Many of the 239 association members who registered at the conference toured the Fisher Governor Co. manufacturing plant at Marshalltown, Iowa, and attended a luncheon after the inspection trip.

Another feature of the meeting was Servel's two-day servicemen's school on the Servel air conditioner. Instructors from the company covered all phases of installation from uncrating of units to start-up and trouble shooting, and the course was completed by 40 servicemen.

## INSTRUMENTATION COURSE

Automatic control—including measurement and control of temperature, pressure and liquid level; time control; and allied subjects —will be covered in a seminar planned for the fourth annual short course on "Instrumentation for the Process Industries."

Sponsored by the Agricultural and Mechanical College of Texas, the course will be held Oct. 12-14 at College Station, Texas. Many industrial concerns manufacturing oil, gas and chemical products will be cooperating in the event.



# Salesman

## You add another every time you deliver a new..

Because their new Hamilton is NEWS—wonderful news—to Hamilton owners, they can scarcely wait to show off this grand new home helper that saves them so much time and toil and trouble.

You can be sure every friend and relative will get a demonstration! You can be sure it will be an *enthusiastic* demonstration, because proud owners always "sell" their friends and folks a whole lot harder than most salesmen would dare to do!

That's a PLUS you never get from the sale of older, more familiar appliances. And it's not the only plus. Remember, Hamilton business is clean-cut, unhampered by trade-ins. It's full-profit business, and the profits stay with you, because Hamilton service is a very small item.

If you sell washers or ironers, you ought to be selling Hamilton Dryers . . . the same folks buy 'em . . . for the same good reasons . . . to save time, save toil, save trouble.

Why not line up NOW with the leader of the Automatic Clothes Dryer industry—the pioneer and founder of it—and reap the good, legitimate *extra* profits your business needs? Write, wire or 'phone *today* to—

**HAMILTON MANUFACTURING COMPANY, TWO RIVERS, WIS.**

In Canada, the Hamilton Dryer is known as the Coffield-Hamilton Automatic Clothes Dryer, and is distributed by Coffield Washer Co., Hamilton, Ontario.

## *You'll have a big volunteer sales force* and they'll own their own demonstrators!

**3 out of 5 NEW HAMILTON OWNERS** interviewed said: "A friend of mine bought a Hamilton . . . that's how I got sold on it!" Owners act that way because they *feel* that way about their new Hamiltons. Every owner is a salesman—every Hamilton in use is a demonstrator!

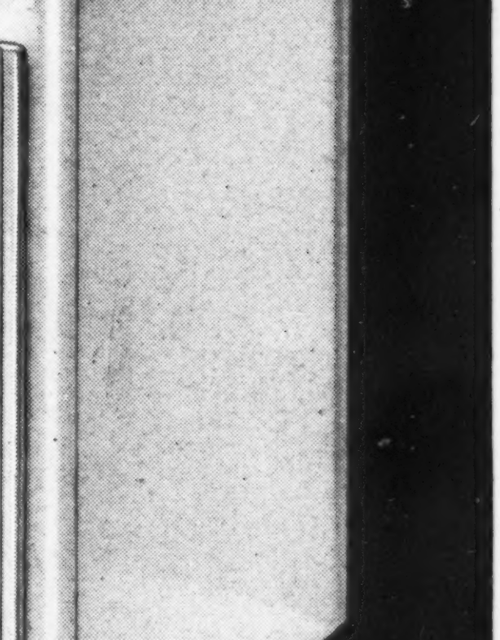
**Hamilton**
**The Original Automatic CLOTHES DRYER**

WITH *New! Exclusive!* **Hamilton** *SUN-E-DAY* Ultra-Violet *LAMP*

REPLACEMENT OR A REFUND OF MONEY ★ Guaranteed by Good Housekeeping IF NOT AS ADVERTISED THEREIN

*Nationally Advertised* to the Millions of Readers of these Great Magazines:

Good Housekeeping ● The Saturday Evening Post ● Better Homes and Gardens ● McCall's ● House Beautiful ● Parents ● American Home ● Small Homes Guide



EXPANSION

# GAS FOR CANADA

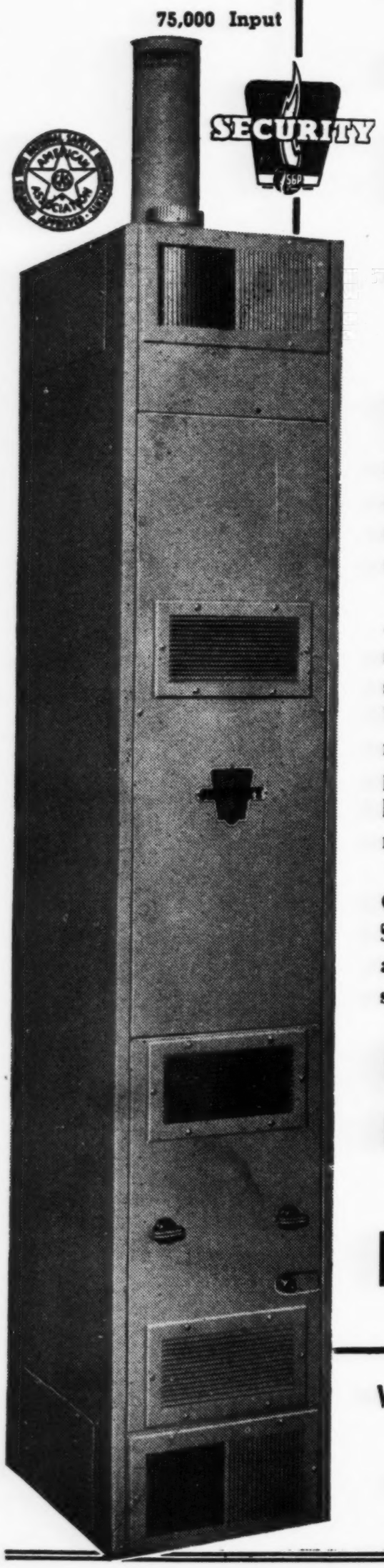
## Recent developments cheer ontario chances

The Province of Ontario, Can., which has had a real gas famine for several years, is beginning to take heart as recent developments in the gas picture are showing promise of an acceleration in supply in the near future. The long-term outlook is still brighter.

A rich strike by Imperial Oil Ltd. of Toronto in the Lambton county area in western Ontario was the harbinger of good things to come. When the biggest gas well discovered in recent years came in with a flow that hurled drilling equipment 30 ft into the air and smashed a control head, it meant a new source of some 15 MMcf per day. Added to this good news was a recent announcement by Union Gas Co., Chatham, that the company has an option from Panhandle Eastern Pipe Line Co., which may materially boost imports from the United States.

Union Gas already has a Panhandle contract, signed in 1944, whereby 5.5 billion cu ft per year was to be delivered to the province. This past summer, small but steady deliveries of Texas gas have been received. In anticipation of additional deliveries, company representatives from Consumers Gas in Toronto, Dominion Natural, and United Gas & Fuel in Hamilton have been making studies aimed at fitting the gas into the market.

Meanwhile, removal of wartime restrictions has already gone ahead in 70 southwestern Ontario communities served by Union Gas Co., made possible by the new Lambton activities. Of 25,000 customers to whom the use of gas was prohibited, 10,000 are being put back on the line.


NOW...

a TRULY Forced Air

INN-A-WALL

...and you can employ duct work where necessary!

**YES, sir . . . here is *the* answer to heating properly small homes without basements. Security's INN-A-WALL is an entirely new principle in forced air heating! Requires minimum duct work . . . may be used without ducts. Needs only 16 by 20-inch floor area.**

**The INN-A-WALL reverses the usual flow pattern . . . warm air comes out the *bottom*. This means *warm floors!* Warm air can be taken from all four sides . . . return air, from all sides at the top. Where ducts are required for distant rooms, permanent connection is made at the bottom. Completely assembled . . . ready to install. Casing height, 88 inches. Security breather tube automatically supplies air for combustion.**

**Other outstanding INN-A-WALL values are • Quiet positive blower • Fully automatic • Special Security high-efficiency burners • Complete adaptability to any floor plan (may be placed in wall or stand alone) • Amazingly economical in price.**

SECURITY

*Automatic, Gas-Fired*

INN-A-WALL FURNACE

*Write Today . . . don't delay. Get all the facts about this revolutionary new furnace.*

SECURITY MANUFACTURING CO.

1630 OAKLAND STREET • KANSAS CITY 3, MISSOURI


# MILWAUKEE STARTS TASK OF CONVERSION TO NATURAL

Changeover of more than a half-million gas appliances was begun in the city of Milwaukee last month. Spokesmen of the Milwaukee Gas Light Co. estimate the job will take four months.

The southwestern section of the city was the first of 35 sections to be switched over from manufactured gas facilities to natural gas by the end of the year, when natural is expected to reach Milwaukee.

Each section to be switched over has about 6300 meters, and the changeover will affect ranges, refrigerators, water heaters, and other gas appliances. Some 1300 men are hard at work on the big job.

While conversion work is being carried on (at the company's expense) and before natural gas arrives, Milwaukee Gas Light will send a mixed gas through the city's pipes.

As conversion work still is in progress, Milwaukee Gas Light is hard at work in selling natural gas to its customers. A large ad appeared regularly in the Milwaukee *Journal* last month, urging prospective natural gas users to register with the company for the use of gas space-heating.

# SOUTHERN UNION BUYS

Southern Union Gas Co. has announced signing a contract to acquire the gas distributing properties of the Public Service Co. of New Mexico. Public Service has been delivering gas purchased from Southern Union in the Albuquerque area.

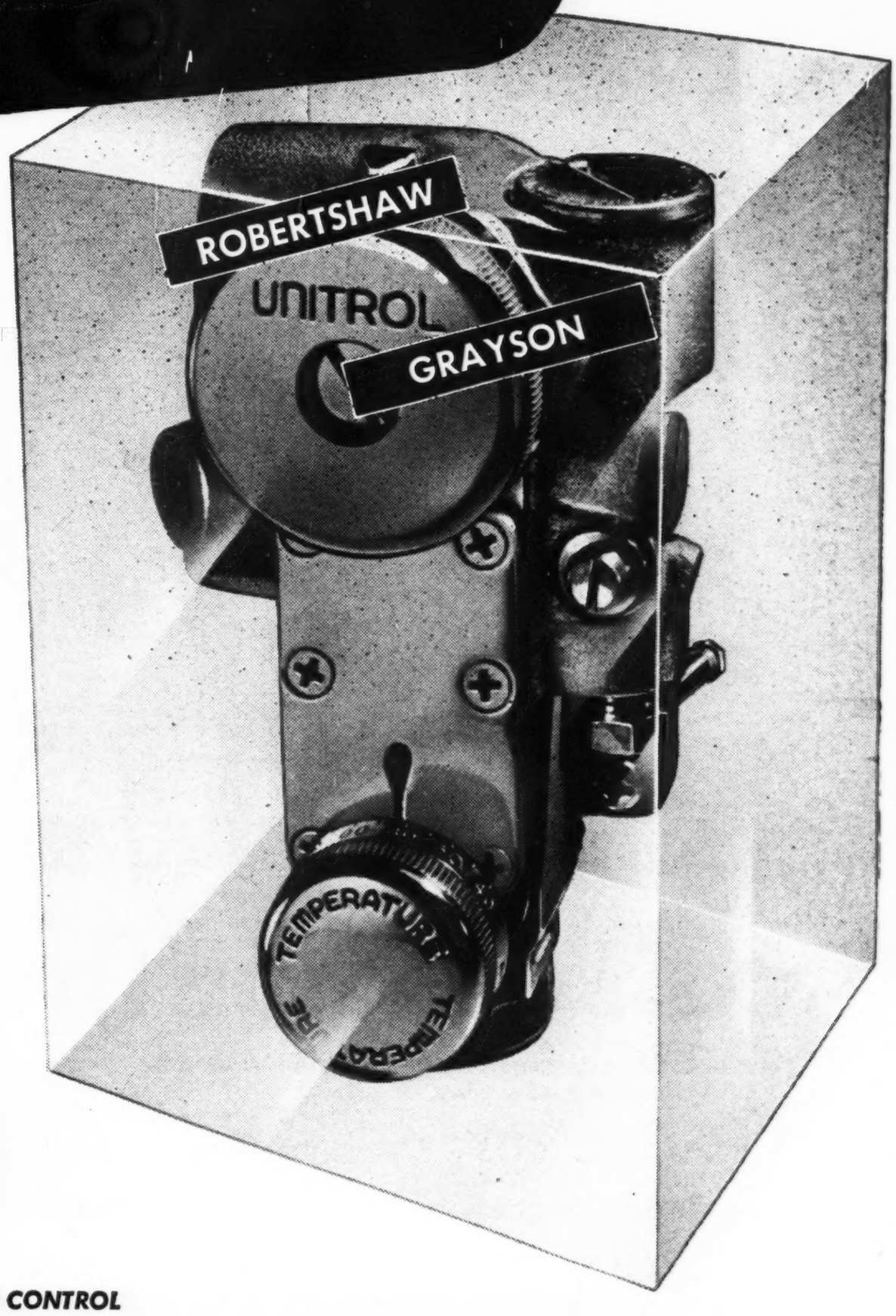
The purchase by the Dallas company involved a reported $4 million. Southern Union has held the franchise for gas distribution in Albuquerque since 1930; Public Service has been operating under that franchise.

The purchase is scheduled to go before the New Mexico Public Utilities commission this month.

# GENERAL CONTROLS BRANCH

General Controls Co., Glendale, Calif., announced last month the opening of a new branch office in Cincinnati to service southern Ohio, southeastern Indiana, and central Kentucky. Jack Prutow has been named manager

# ALL 5 AUTOMATIC GAS WATER HEATER CONTROLS IN ONE "PACKAGE"




☆ **Main Gas Cock with Flow Adjustment**

☆ **Thermo-magnetic Automatic 100% Safety Pilot**

☆ **Snap Action Thermostat**

☆ **Pilot Valve and Pilot Adjustment Valve**

☆ **Filter for Pilot Gas**

AUTOMATIC GAS WATER HEATER — GAS APPLIANCE MANUFACTURERS ASSOCIATION — COURT OF FLAME — SYMBOL OF QUALITY

*In home and industry, **EVERYTHING'S UNDER CONTROL***

# Robertshaw-Fulton

CONTROLS COMPANY—GREENSBURG, PENNSYLVANIA

**ROBERTSHAW THERMOSTAT DIVISION,** Youngwood, Pennsylvania • **GRAYSON CONTROLS DIVISION,** Lynwood, California
**FULTON SYLPHON DIVISION,** Knoxville, Tennessee • **AMERICAN THERMOMETER DIVISION,** St. Louis, Missouri
**BRIDGEPORT THERMOSTAT DIVISION,** Bridgeport, Connecticut

of the new branch.

At the same time General Controls reported the moving of its Oklahoma City office to Tulsa.

The two changes bring the total of General Controls branch offices to 21.

## UTICA GAS BOOST ASKED

The Central New York Power Corp. has petitioned FPC for approval of a plan to supply 4.1 MMcf of natural gas daily to its Utica division and to increase its service in the Syracuse-Oswego region.

The proposal involves building of a 16-mile line from 16 miles south of Utica to that city. Some 3500 customers now served with manufactured gas would be switched over to natural if the plan is okayed.

# FINANCIAL

## BOILER SHIPMENT UP, BUT HEATERS, RANGES OFF 1948 PACE

With 14 companies reporting, The Gas Appliance Manufacturers Assn. has announced an 11.2% increase in shipments of gas-fired boilers during the first half of 1949 over the same period in 1948. The companies reporting represent 98% of the industry.

Shipments of boilers in June 1949 jumped a husky 33.9% over those of the same month last year.

A total of 30,883 boilers was shipped at a value of $10.14 million in the year ended June 30, 1949.

Concurrently, unit shipments of gas conversion burners in the first half of this year zoomed up 344.5% over the like period last year, and shipments of gas-fired furnaces were up 17%.

Heating-stove shipments for May and June of this year were staggeringly off the pace of last year, according to the census bureau: 45,821 and 62,507 for the two months of this year; 170,523 for June 1948. For the first six months of 1949, heating-stove shipments totalled 257,782—for the first six months of 1948, they were 828,353.

Gas range shipments likewise suffered from the nationwide business sag last spring. The total shipped in the first two quarters of this year was 803,436—compared with 1,353,007 for the corresponding period of 1948.

## AGA-EEI FINANCING GUIDE OFF THE PRESS

A detailed study of the problems incidental to the financing of the tremendous post-war capital expansion in the gas and electric utility industries is now ready for distribution. The study, a joint effort of AGA and EEI, was designed to assist member companies in financing capital programs, but it is also available to other groups.

The work of a committee of utility industry executives under the chairmanship of E. W. Morehouse, vice president of General Public Utilities Corp., and H. H. Scaff, vice president of Ebasco Services Inc., it discusses, among others, the following problems:

Changes in income distribution in recent years and the consequent effects on the accumulation of savings; how utility management may arouse interest in the purchase of equity securities by individuals in medium income levels; regulatory requirements concerning competitive bidding; and an analysis of what constitutes the necessary levels of utility earnings if utilities are to be able to maintain their credit position and capital structure and to obtain necessary funds to finance construction.

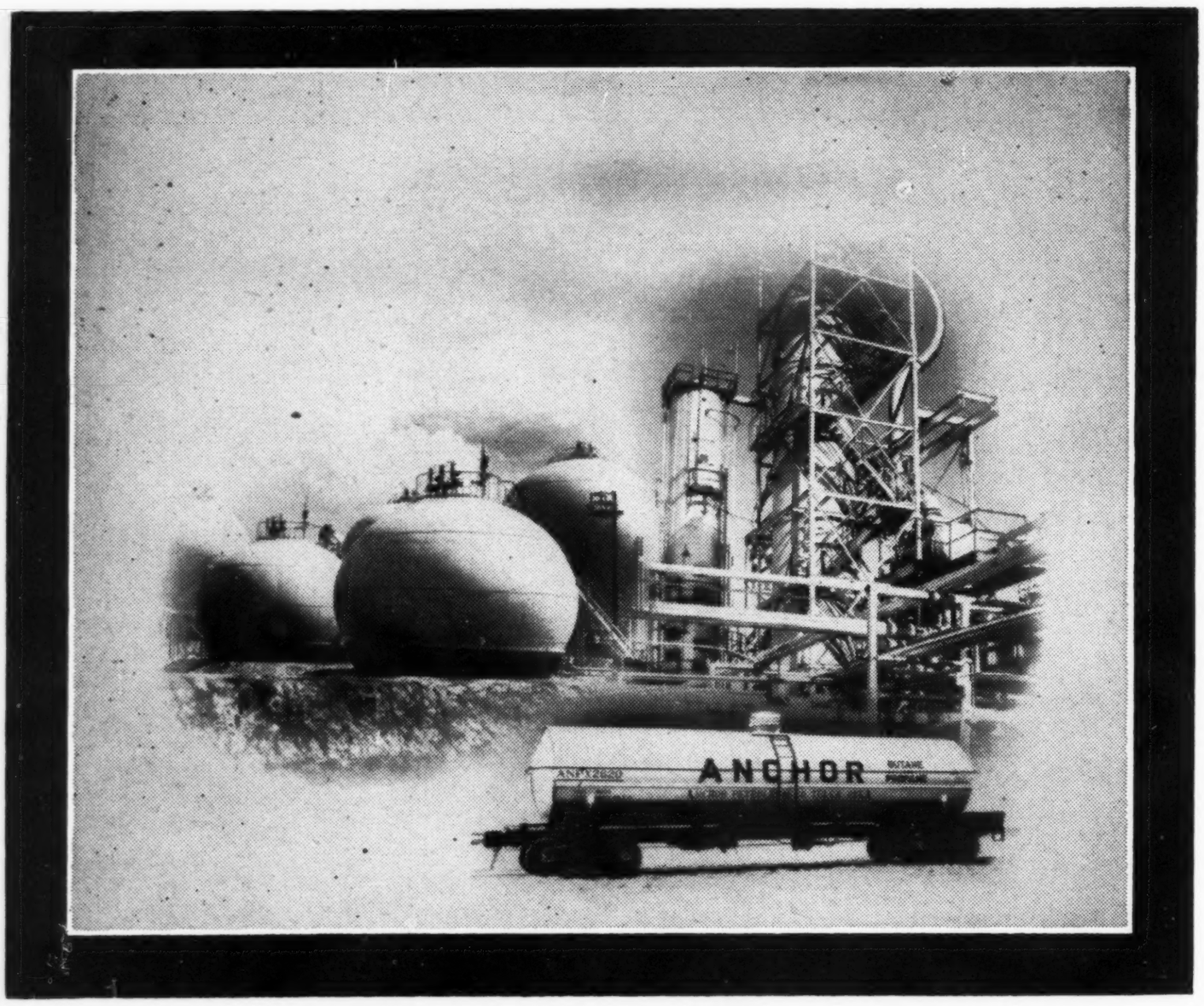
## GAS SALES, REVENUES CLIMB

Total gas revenues for the second quarter of 1949 were $391 million, the American Gas Assn. has reported. The total represents an increase of 9.2% over the like period last year.

For the year ending June 30, utility revenues totaled $1.62 billion, an increase of 9.8% over the $1.476 billion reported for the previous year.

During 1949's second quarter, commercial sales registered the largest percentage gain, climbing 18.5%. Residential gas revenues went up to 7.7% and industrial gas revenues rose 8.3% over a year earlier.

In quantity, gas utilities sold 2,083,014,000 therms in July—3.5% above the total for July 1948. For the 12-month period ended July 30, gas sales (in therms) were up 10.6% over the previous year.

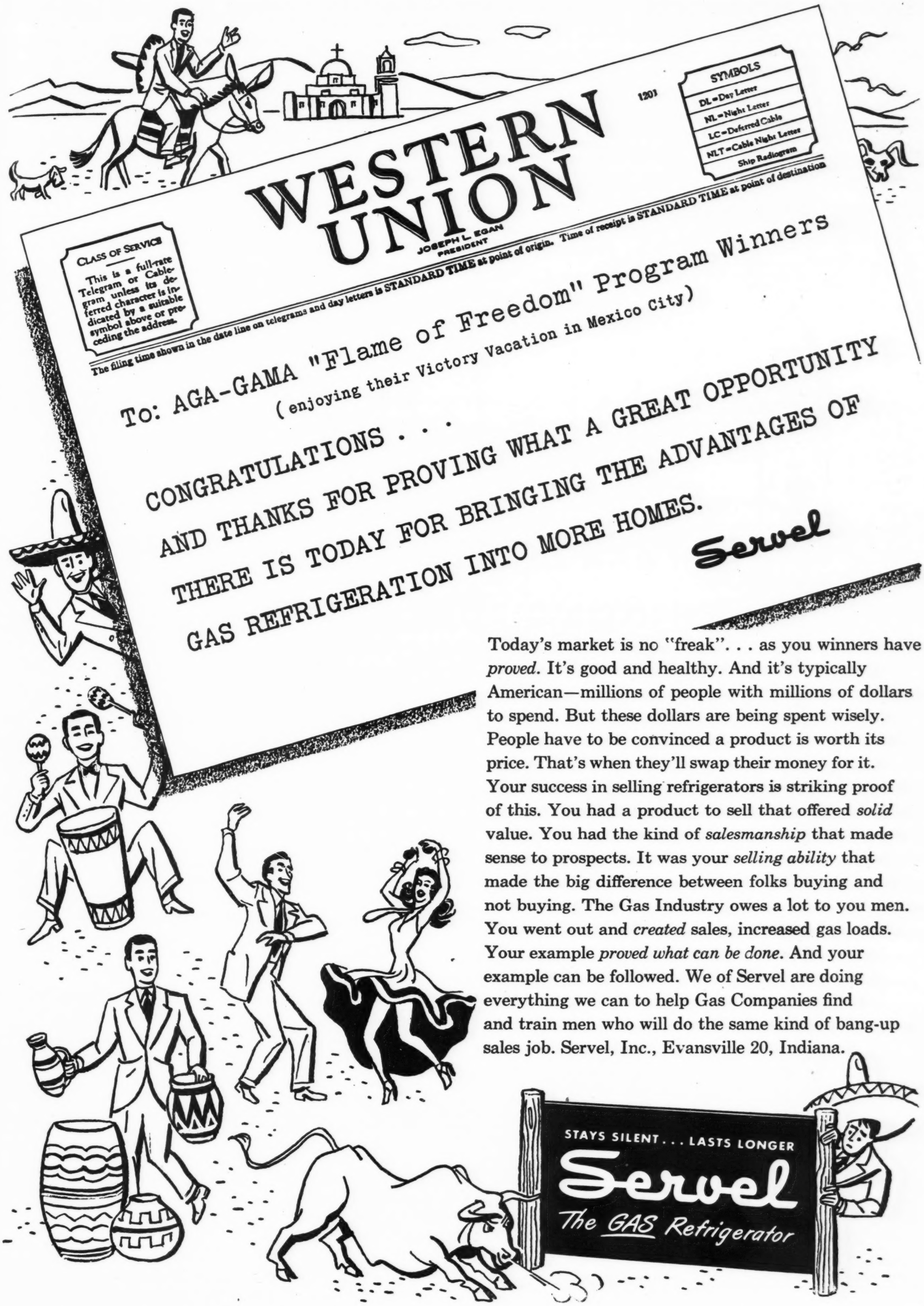

**call anchor first**

**LP-Gas for: Stand-by Plants - Peak-load Demands - Industrial Plants - Cities and Towns**

From our strategically-located plants we are able to give quick delivery on high-quality ANCHORGAS, Butane-Propane. Shipments by rail, water, or transport. For dependable gas service, call us before you renew your contract. Ask about Anchor's special contract.

**ANCHOR PETROLEUM COMPANY**

Atlas Life Bldg. Tulsa, Oklahoma


WESTERN UNION
JOSEPH L. EGAN
PRESIDENT
1201
SYMBOLS
DL = Day Letter
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram
CLASS OF SERVICE
This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.
The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination
To: AGA-GAMA "Flame of Freedom" Program Winners
(enjoying their Victory Vacation in Mexico City)
CONGRATULATIONS . . .
AND THANKS FOR PROVING WHAT A GREAT OPPORTUNITY
THERE IS TODAY FOR BRINGING THE ADVANTAGES OF
GAS REFRIGERATION INTO MORE HOMES.
Servel
STAYS SILENT . . . LASTS LONGER
Servel
The GAS Refrigerator

Today's market is no "freak". . . as you winners have *proved*. It's good and healthy. And it's typically American—millions of people with millions of dollars to spend. But these dollars are being spent wisely. People have to be convinced a product is worth its price. That's when they'll swap their money for it. Your success in selling refrigerators is striking proof of this. You had a product to sell that offered *solid* value. You had the kind of *salesmanship* that made sense to prospects. It was your *selling ability* that made the big difference between folks buying and not buying. The Gas Industry owes a lot to you men. You went out and *created* sales, increased gas loads. Your example *proved what can be done*. And your example can be followed. We of Servel are doing everything we can to help Gas Companies find and train men who will do the same kind of bang-up sales job. Servel, Inc., Evansville 20, Indiana.

## UNITED WANTS HYDROCOL STOCK

United Gas Corp., Shreveport, has asked the SEC for permission to increase its holdings in Carthage Hydrocol Inc. which is building a plant near Brownsville, Texas, to make gasoline from natural gas.

At the time United bought into the company the cost of the plant was estimated at $14 million, but changes in plans and increased costs have raised the estimate to $38 million.

## OHIO FUEL TARIFF SUSPENDED

Suspension, pending hearing and decision, of a proposed natural gas tariff filed by Ohio Fuel Gas Co. was ordered last month by the FPC. The tariff would have increased Ohio Fuel's rate for wholesale service by $1,228,568 annually, based on anticipated sales for the 12-month period ending February 1950.

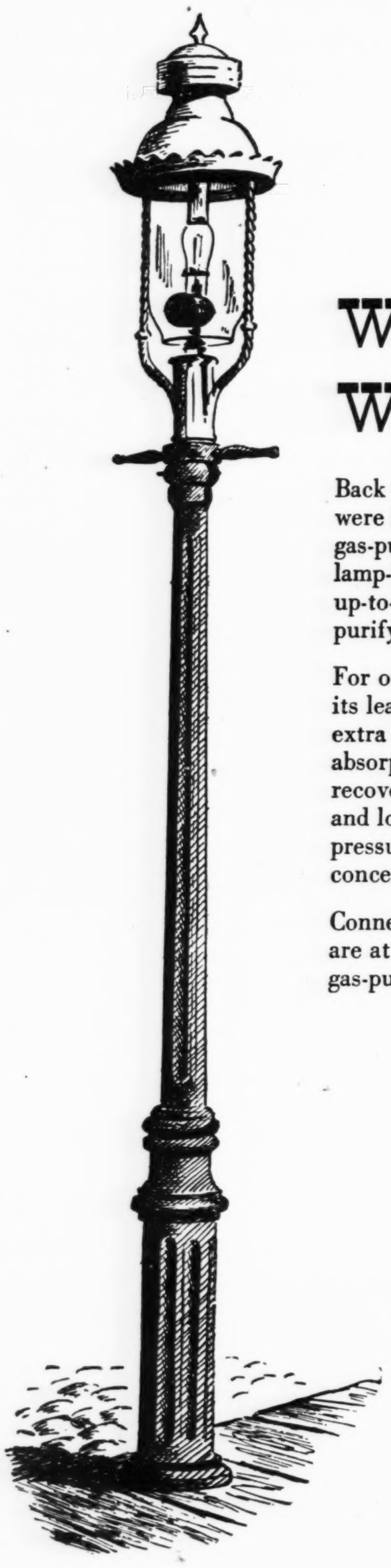
Commission spokesmen said that a number of protests and petitions for hearing in connection with the rate increase have been received. It was one of the largest rate increase proposals ever submitted to the commission by a gas utility.

FPC has scheduled a hearing concerning lawfulness of the rates to commence Nov. 15 in Washington, D.C.

## FLORIDA PROPERTIES SOLD

South Atlantic Gas Co.'s properties in DeLand, Sanford, and Orange City, Fla., have been purchased by Florida Home Gas Co., a corporation headed by A. H. Gaede of DeLand, it was announced last month.

Mr. Gaede has been associated with South Atlantic since his discharge from the army in 1946. The company took over the properties in that year. Value of the property is $300,000.

WHEN GAS LAMPS WERE MODERN . . .

Back in the "good old days," when lamps were lit with gas, Iron Sponge was the *modern* gas-purification material. Today, the old lamp-lighter is gone, but Iron Sponge is still up-to-date—still the most efficient and economical purifying medium obtainable.

For over 74 years, Iron Sponge has retained its leadership because of these advantages . . . extra high activity and capacity, maximum absorption, longer periods between necessary recoverings, fast comeback, low initial cost, and low maintenance costs, ideal for high or low pressure purification and high or low $H^2S$ concentration or mere traces.

Connelly's experience and engineering facilities are at your service. If your problem is gas-purification, consult Connelly.

***Other Connelly products include:***

**CALOROPTIC**
A simple, inexpensive instrument for continuous direct readings and BTU control applied to manufactured, natural, propane, and butane air gas.

**SMYLY H2S TESTER**
A patented device for quick, accurate tests using pre-treated paper discs.

**CONNELLY pH TEST KIT**
A complete simple outfit for making pH determinations. Includes universal indicator solution, test tubes, color chart and full directions. Handy 3" x 5" pocket carrying case.

CONNELLY, Inc.

**3154 S. California Ave., Chicago 8, Illinois**

**Elizabeth, New Jersey • Los Angeles, California**


# MISCELLANY

## DRESSER EXPORTS SOARING

Export orders for oil and gas-producing equipment of Dresser Industries Inc. (Cleveland, Ohio), from Argentina, Yugoslavia, Turkey, and Italy, will total at least $7 million and may run as high as $10 million, Vice President J. B. O'Connor has reported.

All the countries but Italy have ordered equipment for oil-producing systems. Italy will install Dresser gas equipment in the Po valley to help supply Italian industry with natural gas. If indications of a large natural gas reserve there are proved, it will minimize the necessity of importing coal for Italian industrial use.

## CONSTRUCTION COMPANY FORMED

A new company—Trugas Constructors Inc.—was formed last month. Directors of American Liquid Gas Inc., a Michigan corporation, announced the change to the new name.

The entire stock interests of all former stock owners have been acquired by Richard T. Hill, formerly treasurer and now president and general manager. Detroit office facilities have been expanded.

Trugas constructs liquefied petroleum, oil, and catalytic gas plants. It recently was appointed exclusive sales representative of the Posey Iron Works, Lancaster, Pa., in Michigan, Indiana and Illinois.

## Budget Your Bills

Consolidated Edison of New York has devised a new scheme which should enhance its popularity with its customers. The plan is to spread payments for house heating service throughout 10 months of the year and thus ease the strain on customers' pocketbooks.

In setting up a budget plan for a customer, Con-Ed estimates in advance the probable usage for the 10 months of September to June. This amount is divided into 10 equal payments and in July the actual use is balanced against what has been paid, with adjustments made at that time. July and August bills will show actual cost and the amount of gas used during those two periods.

The company figures that about 82% of the fuel used in the city is burned in the coldest five months. The budget plan is voluntary.

# PROSPECTS are "GOLDEN"

## More PROSPECTS become SALES

...WHEN YOU OFFER THE

# EMPIRE

## *Gas* FLOOR FURNACE

### IT WHIPS COMPETITION ALL WAYS

▪ ▪ ▪ ***in*** **ENGINEERING** Improved designing . . . superior construction . . . thorough "Know How".

▪ ▪ ▪ ***in*** **PERFORMANCE** Healthful, uniform heating and trouble-free service.

▪ ▪ ▪ ***in*** **AUTOMATIC HEAT CONTROL** Thermostatically controlled heat as desired.

▪ ▪ ▪ ***in*** **ADAPTABILITY** Can be adapted to any type home, office, or store and to the available gas supply.

▪ ▪ ▪ ***in*** **ECONOMY** The "Thriftmatic" Gas Burner assures lowest fuel costs.

EQUIPPED WITH THE FAMOUS *"Thriftmatic Gas* BURNER *devoloped by* EMPIRE

*See The EMPIRE Representative in Your Territory or Write Us Direct*

EMPIRE STOVE CO., BELLEVILLE, ILLINOIS

MANUFACTURERS OF GAS HEATING AND COOKING APPLIANCES

# PEOPLE

R. C. GRIMSTAD has been appointed manager of the rate department of Philadelphia Co. & Subsidiary Co.'s, including Duquesne Light Co. and Equitable Gas Co. He succeeds the late N. E. French. Mr. Grimstad joined Duquesne Light in 1926 and has served in many capacities. At the time of his recent appointment, his position was rate analyst and director of rate research.

JOHN A. ROBINSON has been named regional sales manager for the Midwest, Northwest, Rocky Mountain and Pacific Coast areas for Brown Instruments division of Minneapolis-Honeywell Regulator Co., and CHARLES E. SHARP succeeds him as Chicago branch industrial manager. Both men joined Brown at the Philadelphia main plant about 20 years ago. In addition to these changes, three industrial sales managers have been named. They include CHARLES D. McINTIRE at Cincinnati, JOHN E. MacCONVILLE at Atlanta and WILLIAM C. WALTMAN, South Bend.

FRANK J. NUGENT, GAMA president and prominent gasman, has been appointed sales manager of heating equipment for Ingersoll Steel Division of Borg-Warner Corp., Chicago. He was formerly sales promotion and advertising manager of Bryant Heater Co., Cleveland, and general sales manager of Rheem Manufacturing Co.'s appliance division. Ingersoll Steel will continue to produce heating products for other manufacturers, and recently the firm has completed development of a line of automatic residential and commercial warm air gas furnaces and winter air conditioners to be sold through distributors. Mr. Nugent will headquarter in Kalamazoo, Mich.

**F. J. Nugent**

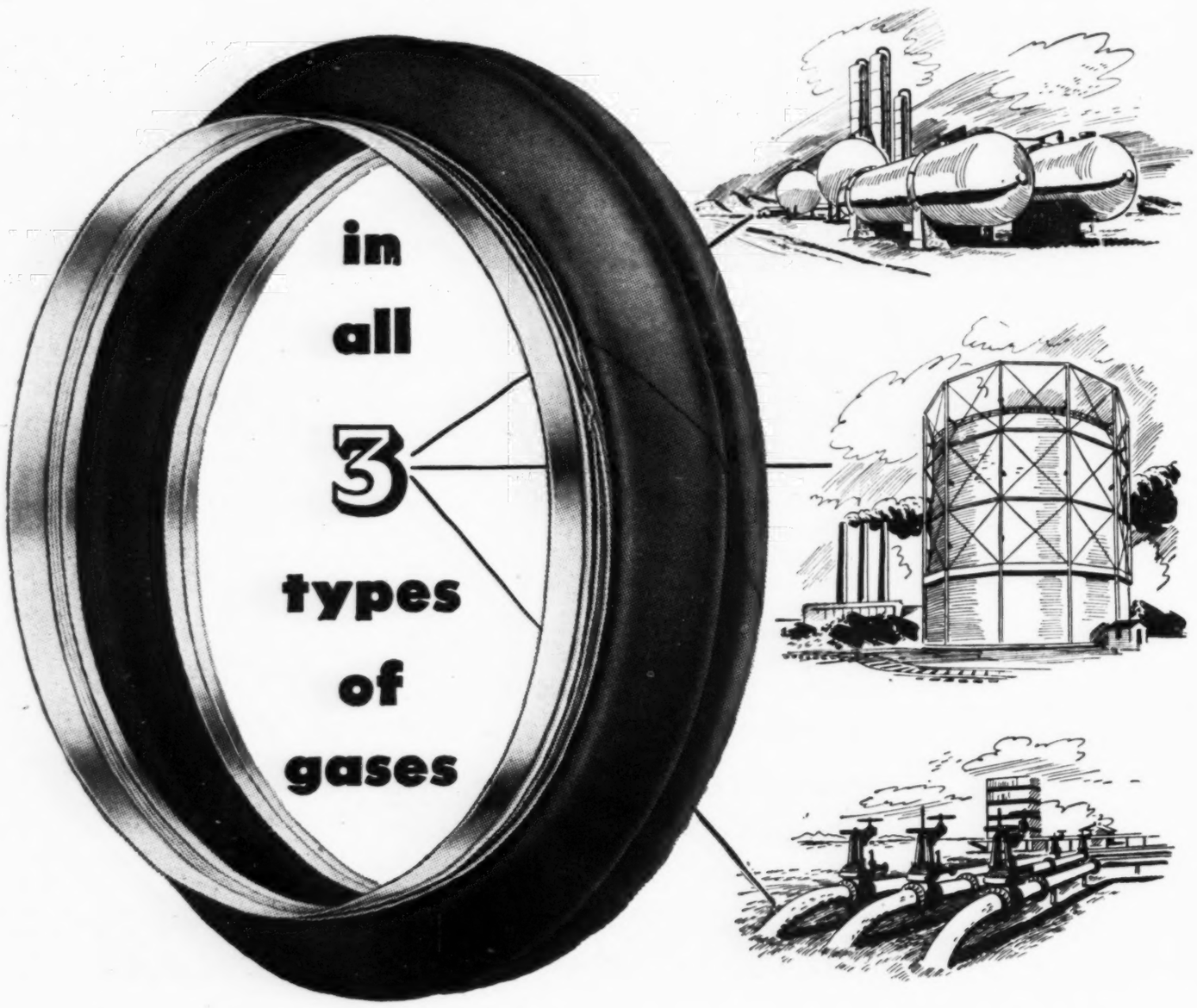
H. EMERSON THOMAS, executive vice president of the Pennsylvania & Southern Gas Co., Westfield, N. J., has announced that the previously published notice of the appointment of C. MacDONALD SWAN as general manager of the company (September *GAS*, p. 87) has been changed. Mr. Swan, who had been manager of the Penn Fuel Gas Co., Oxford, Pa., was made president of that company in a recent reorganization. Mr. Thomas temporarily will assume the duties of general manager of Pennsylvania & Southern.

W. R. JOHNSON has succeeded the late Charles E. Hays as division meter engineer of division No. 1 at Bradford, Pa., for The Pittsburgh Group of The Columbia Gas System Inc. Replacing Mr. Johnson in a similar position at Uniontown is W. H. WHARTON formerly district meter engineer at New Brighton. A. C. MYERS, meter engineer at Wheeling, W. Va., has been made engineer in district No. 2-B and will headquarter at New Brighton.

HERBERT C. ERHARD has been appointed sales manager of the Oriole and Acorn gas range divisions of Perfection Stove Co., Cleveland, Ohio. Since the first of the year Mr. Erhard has been sales manager of the Anderson (Ind.) Stove Co. Formerly, he was associated with Standard Gas Equipment Corp., Baltimore, for more than 25 years. Perfection recently purchased Standard Gas Equipment's domestic range lines.

PHILIP H. HARDIE and CLARENCE P. WILSON have become associated with Ebasco Services Inc., New York, as principal mechanical engineers. Mr. Hardie has had experience in power plant design and engineering, having been associated with ConEd for 15 years and, before that, with Brooklyn Edison Co. and Westinghouse Electric Corp. Mr. Wilson was in charge of the design of power plants in Alaska before joining Ebasco.

W. E. CONKRIGHT has been appointed sales promotion and advertising manager of General Controls Co., Glendale, Calif. Mr. Conkright has had long experience in the industrial advertising and promotional fields and was formerly connected with International Harvester Co. and Harnischfeger Corp. of Milwaukee, Wis.


# Vulcan Diaphragms Excel!

**Whether the gas is manufactured, natural or L.P., VULCAN Diaphragms for meters and regulators give outstanding performance.**

**The VULCAN Molded Loop is streamlined, smooth and perfectly balanced, free from irregularities of shape. Because of vulcanizing to the rings, plus fastening with special wire, tie leaks are virtually impossible.**

**VULCAN Diaphragms remain pliant and flexible, with no need for oiling. They do not dry out and become brittle, and successfully withstand the drying effects of both natural and L.P. gases. For more accurate metering, follow the lead of engineers everywhere. Specify VULCAN Diaphragms.**

Vulcan
PROOFING COMPANY
FIRST AVENUE & 58th STREET • BROOKLYN 20, NEW YORK

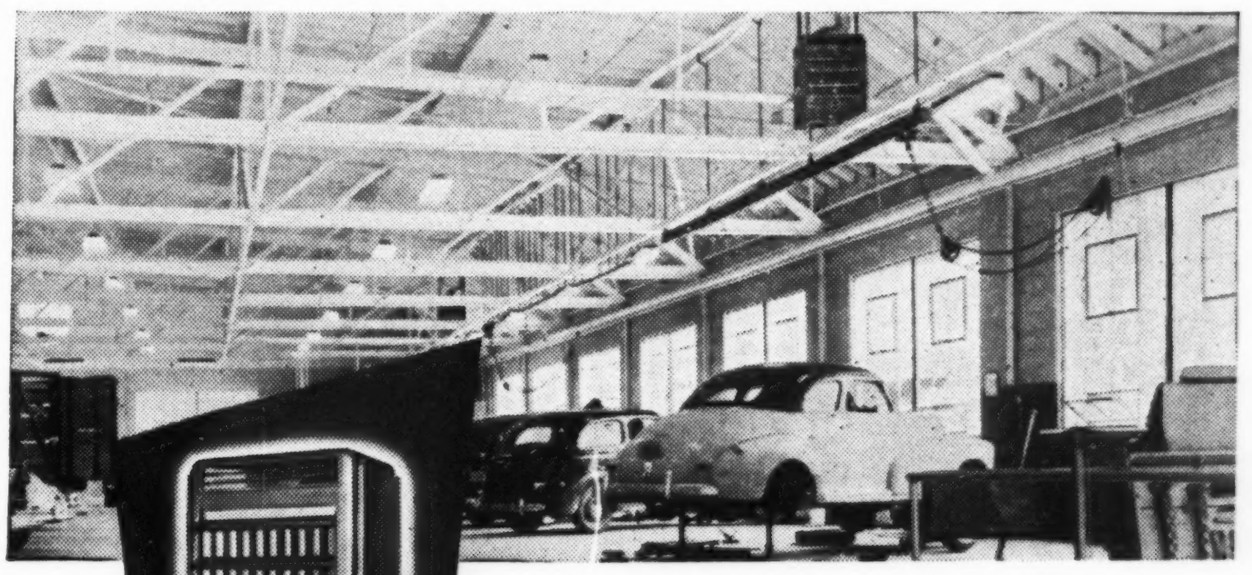
# Special Assignment

## FOR A TRIO OF EXPERTS

Three types of Bryant equipment, all operated on LP-Gas, provide the heating comfort in this newly completed Albany, Georgia, automobile agency. Showroom and offices are winter air-conditioned. Well-placed unit heaters maintain constant comfort in the large service department and garage. An individual heater, which supplies welcome warmth by both radiation and circulation, guards the comfort of mechanics and other employees in their locker and shower room. It's a case where more than one type of heating unit is needed to provide adequate heating, efficiently and economically.

When your heating job requires diversified equipment, specify *all* your needs from the most complete line of gas heating equipment in the nation—the Bryant Line. You get uniform quality in every type of unit, and you're sure of *expert* performance, on any gas, for every Bryant unit is experience-proved. Your Bryant Distributor stands ready to help you select the units that will help you sell your job.

Winter air conditioning of Albany Motors Co.'s beautiful showroom is assigned to the Bryant VS-304. Architect is Richard V. Richard of the firm of Dennis and Dennis, Architects, Richard V. Richard, Associate, of Albany, Ga.



Bryant Model US-322 Unit Heaters get the call for the job of heating Albany Motors' vast service department and garage, part of which is shown above.

Expert on body comfort is the Bryant Model VC-426 Radiant Circulating Heater, installed in employees' locker and shower room. Heating Contractor for Albany Motors Co. building is Vance J. Law of Consumers Gas Company, Albany, Georgia.

Let the pup be furnace man
... and water boy, too!

**bryant**

AUTOMATIC HEATING

**BRYANT HEATER DIVISION**

*Affiliated Gas Equipment, Inc.*

**Cleveland, Ohio • Tyler, Texas**

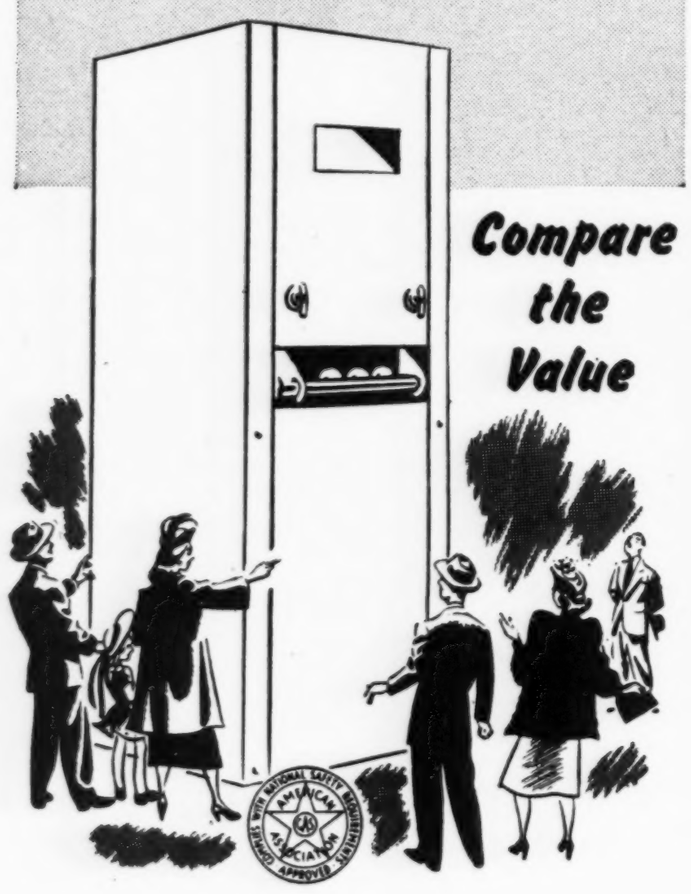
**THE MOST COMPLETE LINE OF GAS HEATING EQUIPMENT IN THE NATION**

ANNOUNCING

*the new*

*Hendy "60"*

**Made by the makers of the famous Henderson "Clipper" furnace (Blower-type Gas Heating exclusively)**



*Compare the Value*

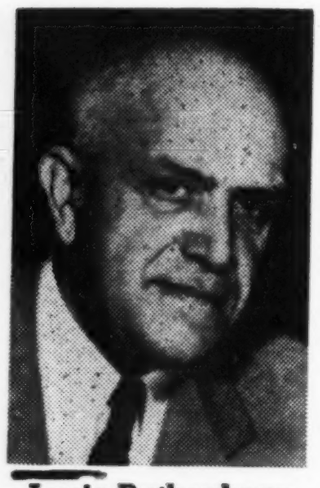
***60,000 B.t.u. input***

Big in performance, small in size. Fully-automatic, high-quality, duct-type forced air heating—at a cost competitive with ordinary heating methods for smaller homes!

- FRONT VENT saves space, makes installation easier in closet or corner. Dimensions: 52" high, by 18" x 30".
- BEST ACCESSORIES, CONTROLS —same as used on Henderson Clipper and Clipperette.
- FACTORY-ASSEMBLED and tested in operation.

***Write or wire for catalog-sheet, prices, dealer opportunities***

**HENDERSON**
FURNACE AND MFG. CO.
Sebastopol, California
CLIPPER · CLIPPERETTE · HENDY "60"

**Louis Ruthenburg**
*. . . Servel*

**W. Paul Jones**

LOUIS RUTHENBURG has been elevated to the newly created post of chairman of the board and chief executive officer of Servel Inc., Evansville, Ind., in recognition of his contributions to the company's development since he became president in 1934. The board named W. PAUL JONES president, general manager and director. Mr. Jones has been in the refrigeration industry for 28 years and at one time was advertising and sales promotion manager of Servel. He resigned as vice president and director of Philco Corp., in charge of the refrigeration division, to accept the Servel post.

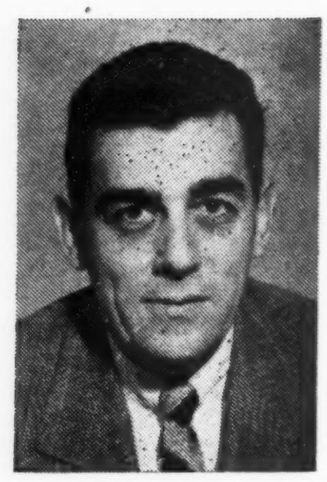
MARC W. PENDER, vice president in charge of sales for American Stove Co., St. Louis, has been appointed to the company's board of directors. CLARK P. FISKE, treasurer, was also appointed to the board and is now secretary and treasurer. TOM GIBBONS moved from assistant advertising manager to advertising manager, and W. T. TRUEBLOOD JR. is sales promotion manager. The changes resulted from the retirement of T. M. SOURBECK, manager at the firm's Lorain, Ohio, factory, and GEORGE E. BAKER, secretary, both of whom were board members, and the resignation of LLOYD C. GINN as manager of the advertising and sales promotion department and member of the board. The third vacancy on the board of directors has been filled by W. B. McMILLAN, Hussmann Refrigerator Co., St. Louis.

BEN OPPENHEIM has joined Anderson (Ind.) Stove Co. Inc. as vice president in charge of sales. The company, a subsidiary of Breeze Corp.'s Inc., Newark, N. J., is preparing a sales promotion and advertising program to be presented to appliance dealers. Mr. Oppenheim has had years of experience in various phases of the appliance field.

L. L. DAVIS, Ardmore district sales manager of the Oklahoma Natural Gas Co., has been promoted to sales manager of the Muskogee district. He took over his new position on Sept. 1. C. A. HERBISON, commercial sales representative in Oklahoma City, has replaced Mr. Davis as district sales manager.

MISS F. PATRICIA CURTIN has joined the Binghamton (N.Y.) Gas Works and will assist Margaret Easley, home service director, in developing the company's home economics program. Miss Curtin was graduated from Syracuse university in June.

W. A. MATHESON JR. has been named manager of the new products division recently created by Perfex Corp., Milwaukee, Wis. Mr. Matheson will handle subcontracting for fill-in production and research on new products.



**D. J. Atwell**
*. . . Dresser*

**John D. Tebben**
*. . . Gas Machinery*

DANIEL J. ATWELL has been named metropolitan district manager for Dresser Manufacturing Division, Bradford, Pa. Operating from the company's New York office, he will work with a number of large utilities in New York, New Jersey, Pennsylvania and Delaware. Mr. Atwell joined Dresser early in 1946 and has serviced gas and water utilities throughout New England, New Jersey and eastern New York.

JOHN D. TEBBEN & CO. has been appointed sales representative in Detroit and Michigan for The Gas Machinery Co., Cleveland, Ohio. Before organizing his own company, Mr. Tebben was general sales manager for the P. R. Mallory Co., metallurgical division, and vice president of its subsidiary company, S-M-S Corp. He and his staff have an extensive background in the metallurgical field.

**Oscar A. Gray**

OSCAR A. GRAY has been appointed sales engineer for United Engineers & Constructors Inc., Philadelphia. Mr. Gray has been an employee of the UGI Contracting Co. and of United for 27 years, serving as appraisal engineer, engineering assistant in the gas design division, construction superintendent, and supervising engineer in the gas design division. He is a member of the AGA and the Pennsylvania Gas Assn.

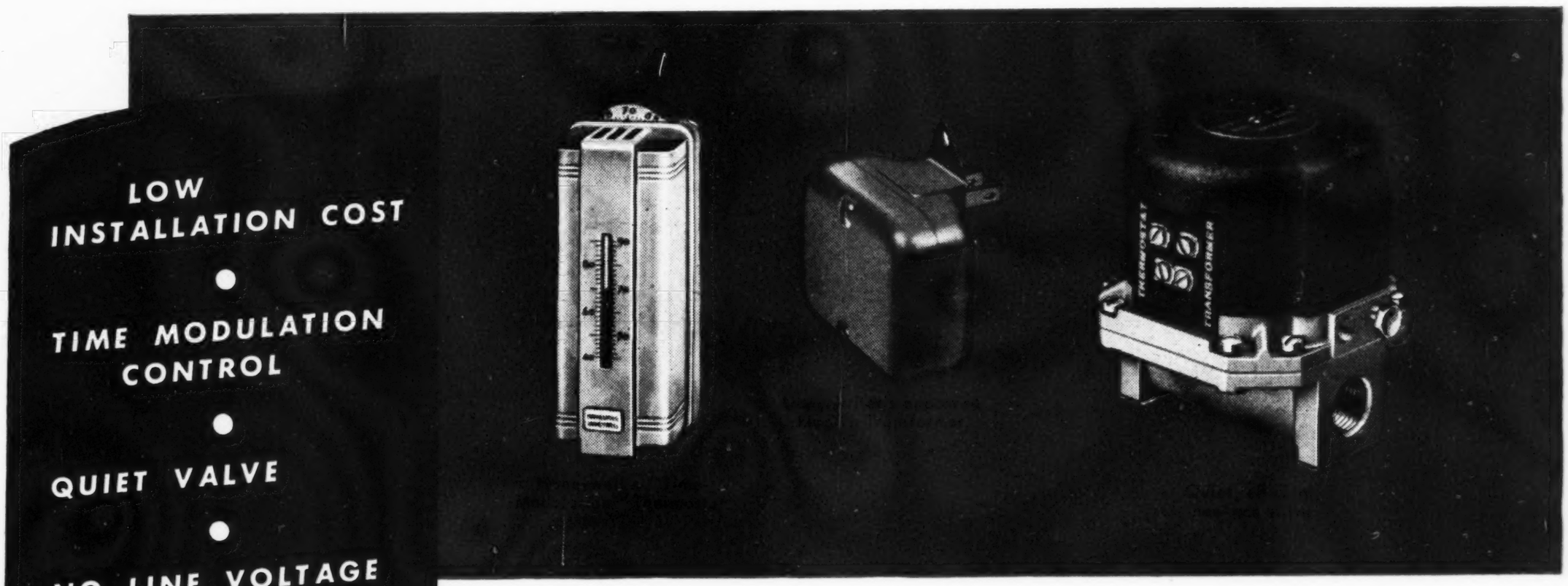
WILLIAM J. KRETZLER has been named general service manager for The Manufacturers Light & Heat Co., Pittsburgh, a newly created position. Other promotions in the company's gas distribution department include JULIAN N. ESTEP, who succeeds the late Eugene Williams as local manager at Gettysburg, Pa.; WALTER BLACK, who takes Mr. Kretzler's place as service manager in district No. 5; JAMES T. WESTCOAT, who is the new foreman in the Jeannette, Pa., area; and BRUCE W. COX, who is foreman in the Salem, Ohio, area.

HARRY MOELLER has been appointed Pacific Coast field representative for Hamilton automatic clothes dryers, headquartering in Portland, Ore., according to an announcement by the Home Appliance Division, Hamilton Manufacturing Co., Two Rivers, Wis. For the past four years Mr. Moeller has been sales manager of the F. B. Connelly Co., Portland.

# A PLUG-IN GAS CONTROL PACKAGE

## WITH THE NEW "TIME MODULATION" THERMOSTAT

**FOR FLOOR FURNACES • SPACE HEATERS • GRAVITY FURNACES AND BOILERS**




NOW you can have the new "Time-Modulation" Thermostat as standard equipment in every "Plug-In" gas control package. For the first time you can now give your customers the temperature control advantages of modulated firing with *your* on-off type burner.

In addition, the "Plug-In" Package brings you powerful new selling features:

- The highest standard of comfort and convenience for floor furnaces, space heaters, gravity furnaces and boilers.
- Easy installation: simply plug in the Underwriter's approved transformer to any line voltage outlet. All wiring is low voltage and installation cost is reduced to the minimum.
- The new Honeywell quiet gas valve . . . acceptable to all markets.

Investigate all the remarkable new features of the "Plug-In" gas control package. Get all the facts at once . . . . Write Minneapolis-Honeywell, Minneapolis 8, Minnesota. In Canada: Leaside, Toronto 17, Ontario.

MINNEAPOLIS **Honeywell**

CONTROL SYSTEMS

73 BRANCHES FROM COAST TO COAST WITH SUBSIDIARY COMPANIES IN: TORONTO • LONDON • STOCKHOLM • AMSTERDAM • BRUSSELS • ZURICH • MEXICO CITY

CHARLES E. BALTZEL has succeeded Howard E. Orton as manager of New York State Electric & Gas Corp.'s Endicott-Oswego district. As announced last month (see September *GAS*, p. 87), Mr. Orton is now manager of the Binghamton division. JOHN R. MOHLER is the new manager at Goshen, the position formerly held by Mr. Baltzel.

T. J. SKRABANEK has been appointed superintendent of compressor stations for Lone Star Gas Co., Dallas. Mr. Skrabanek succeeds B. L. ROGERS, who retired on Aug. 1.

STAN B. SCHRAMECK has been appointed manager of marketing personnel and sales training of General Electric Co.'s air conditioning department. Other additions to the same department include the appointment of G. W. HART as manager of market research and JOHN R. GOWELL as manager of sales forecasting.

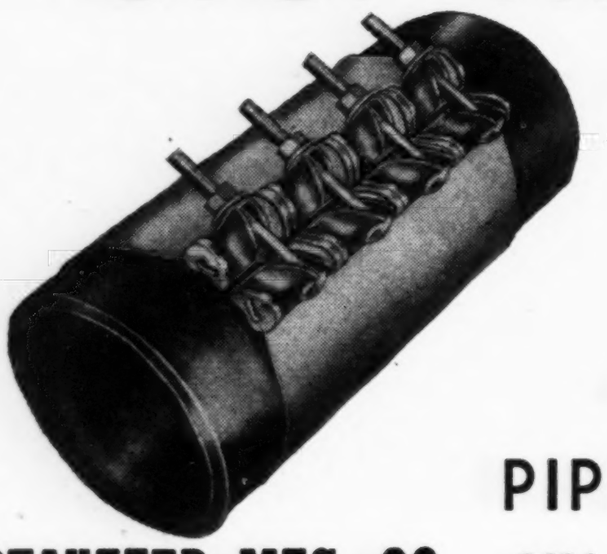
CHARLES M. WERLY, of Duxbury, Mass., has been elected to the board of directors of United Gas Corp., Houston. Mr. Werly is a trustee of the George Putnam Fund of Boston, a substantial holder of United Gas stock.

HARRY CAIN, C. B. SEARLE, E. L. COVIN and F. F. McMULLEN were mentioned in the August issue of GAS as having new positions with Lone Star Gas Co., Dallas. Our apologies to everyone concerned—all four men are employees of United Gas Corp., Houston.

## - OBITUARIES -

E. T. HOWARD, general sales manager of Fraser & Johnston Co., San Francisco, died suddenly on Aug. 24 from a heart attack. Mr. Howard had been associated with the company for the past three years. He had been connected with the gas industry during his entire working life, serving successively with Ray Oil Burner Co. and H. R. Basford Co., both in San Francisco, and from 1936 to 1946 as general sales manager of General Controls Co., Los Angeles. Mr. Howard was active in the AGA manufacturers sections throughout his career, and in 1945-46 he was a director of the PCGA and chairman of that association's manufacturers section.


STOP THAT LEAK!



the FAST and EASY way

with STAUFFER PIPE REPAIR CLAMPS

STAUFFER MFG. CO. 8424 OTIS ST., SOUTH GATE, CALIF.

**John N. Dodds** *. . . Cleveland Trencher*

**E. T. Howard** *. . . Fraser & Johnston*

JOHN NELSON DODDS, 42, service engineer for the Cleveland (Ohio) Trencher Co., died recently after a long illness. Mr. Dodds had been with the company for nine years and was widely known throughout the gas industry.

PHILIP F. DAVIS, 46, a system commercial manager of Consolidated Edison Co. of New York Inc., died Aug. 15 in New York. He had a heart attack a few days earlier while vacationing in Newfoundland. Mr. Davis had been associated with ConEd since 1938 and prior to that time had served with Northern New York Utilities, Niagara Hudson Power Co., Westchester Lighting Co., Utica Gas & Electric Co. and Brooklyn Edison Co.

ALONZO J. BALCOM, 68, who retired three years ago as superintendent of communications facilities of the Magnolia Pipe Line Co., died last month in Dallas. In 1911 Mr. Balcom took a job with the Prairie Oil & Gas Co. of Kansas and moved to Dallas in 1914. He had been with Magnolia for 44 years when he retired.

DR. CHARLES N. GOULD, discoverer of the Amarillo (Texas) oil and gas field, died recently at Norman, Okla., at the age of 81. For almost half a century Dr. Gould was one of the nation's leading geologists and mineralogists. His scientific writings on petroleum and natural gas were widely read.

CHARLES A. JOHNSON, for the past 30 years superintendent of the street department, Public Service Co. of Colorado, Denver, died recently. Mr. Johnson had joined the firm in 1903 as a meter reader, moved to the collections department and then became a draftsman in the street department.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IF YOU ARE NOT A REGULAR SUBSCRIBER TO GAS

In GAS each month you will find dozens of ideas that will help you know your business better and do your job better. Just one of these ideas coming to you on our pages can pay you many, many times the small cost of a subscription.

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☐ Check is enclosed ☐ Please bill me

NAME_____ POSITION_____

COMPANY_____

STREET CITY ZONE STATE

# For *Dependable* Hot Water Heater Operation!

**TITAN**
**WATER HEATER CONTROLS**

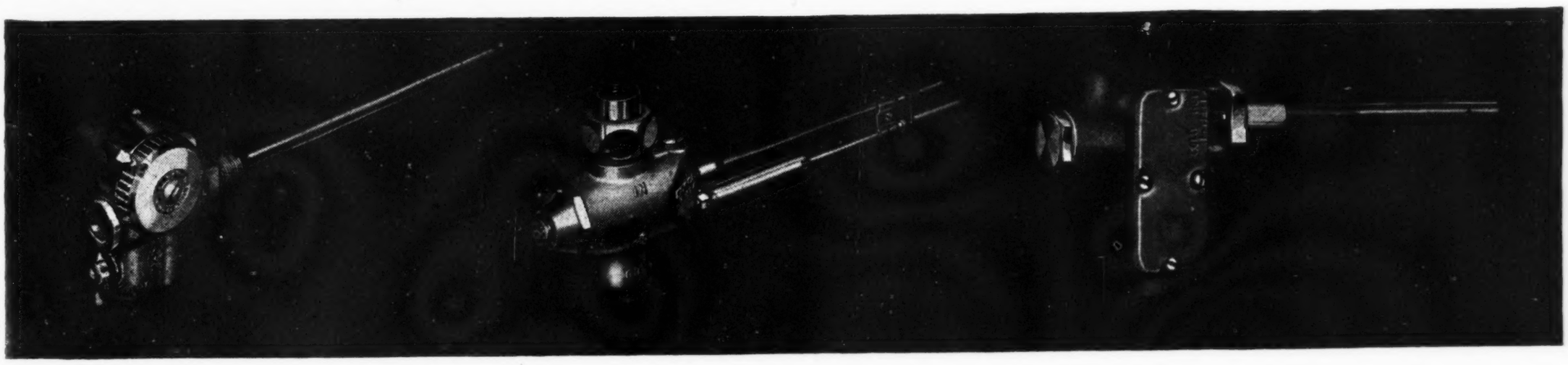
**Automatic Hot Water Heaters are one of the important contributors to enjoyable, comfortable living. Their trouble-free operation is necessary for that comfort.**

**It is essential, therefore, that every Automatic Hot Water Heater be equipped with dependable controls — controls that have demonstrated their reliability in thousands and thousands of installations.**

**TITAN WATER HEATER CONTROLS are dependable and have the backing of satisfactory service for many years. May we give you complete information about TITAN CONTROLS for your use?**

## THE TITAN VALVE & MANUFACTURING COMPANY

**9913 ELK AVENUE** **CLEVELAND 8, OHIO**



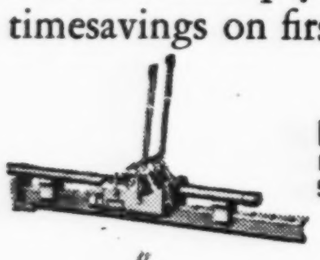
CUT COSTS

ON UNDERGROUND

PIPING JOBS

...with a GREENLEE PIPE PUSHER

Installing pipe underground is quick and simple this way. With a GREENLEE Hydraulic Pipe Pusher *one man* pushes pipe through the ground—under streets, railways, walks, lawns, floors. Saves time, cuts costs through elimination of extensive ditching as just a short trench accommodates the Pusher. No tearing up of pavement, lawns, floors . . . eliminates tunneling, back-filling, tamping, repaving. Cuts job time to a fraction. Pusher often pays for itself through timesavings on first job or two.



**No. 790 GREENLEE PUSHER**
For 3/4 to 4-inch pipe. Six speeds—5,600 to 40,000 lbs. pushing pressure.

**No. 795 GREENLEE PUSHER**
For pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. Six speeds—25,000 to 150,000 lbs. pushing pressure.

**POWER PUMP** For both sizes of GREENLEE Pushers. Pushes pipe at rate of two feet per minute.

TOOLS FOR CRAFTSMEN
GREENLEE

Get facts on timesaving Greenlee tools now. Write Greenlee Tool Co., Division of Greenlee Bros. & Co., 1950 Columbia Avenue, Rockford, Illinois, U. S. A.




# GAMA Cowboys Urge Corralling of Old Stoves

"It's round up time again" and utilities, dealers, and manufacturers all over the nation are busy with their lariats lassoing antiquated ranges and whooping it up for modern gas cooking equipment. Ten regional meetings, starting with the Atlanta (Ga.) rodeo Aug. 1 and starring such hard riding hombres as Cliff Hill, Vinton Potter, and Frank Williams of AGA and Jim Gorton of GAMA, have spurred the industry into a concerted drive aimed at sending some 25 million overage critters to the slaughterhouse.

Reportedly the first company to join the rodeo was Nashville (Tenn.) Gas & Heatnig Co., which jumped the gun by firing the opening gun July 20. The company's all-out performance was declared a real hit.

Smart, publicity-wise Nubs Fratt, Seattle Gas Co. sales manager, pulled off one of the prize stunts by substituting a chic ladies hat for the 10-gallon topper that is ordinarily considered the proper sartorial accompaniment of the wild west costume. Through the cooperation of Best's Apparel, every lady who traded in her old range—for a liberal allowance—received free a certificate for a $20 hat. A spanking new gas range placed in Best's biggest corner window was tinted "autumn mist," the color Best's is featuring for fall.

A $100 prize for the oldest range turned in was also offered, and Seattle took fullest advantage of the tie-in gimmicks featured in the campaign — flame - pops, balloons, and all.

Other gadgets tha tare proving popular are lariats, window streamers, potholders, and assorted bill designs.

And speaking of bonnets—Cribben & Sexton, makers of "Universal" ranges, have won the hearts of children with an Indian war hat. In the first two weeks, 50,000 were ordered.

**GUN-TOTIN' Hugh Cuthrell, Brooklyn Union, fires opening shots at New York.**

**A REAL VETERAN, this 50-year-old Jewel, is surrendered by 87-year-old Celia Hewett to F. W. Williams, AGA (left), and C. W. Steele, Gasco, on first day of Portland (Ore.) Round Up.**

**AGA AND UNIVERSAL COWPOKES ready to ride. With AGA's Norv Jennings (bottom row, left) and Cliff Hall (behind him), C&S men at the Chicago meeting were Earl Smith and George Waber, Chicago; Ted Carrew, Omaha; and Al Bradtke, Detroit; first row: Joe Doll, Milwaukee; Tom Hansen, Green Bay; Fred Shoenwolf, Chicago; George Mohr, St. Louis; Al Barnhart, Cleveland; Tom Honega, Chicago.**

SOUTHERN COUNTIES and Southern California Gas Co.'s display at the Los Angeles county fair left no doubt in spectators' minds that Gas Has Got It. The co-sponsored exhibit was one of the largest at the Sept. 16-Oct. 2 fair held at Pomona, Calif.

A 20 x 100-ft area directly in front of the main entrance was constructed of redwood and flagstone and contained three New Freedom Gas Kitchens, each completely air conditioned by a 5-ton Servel all-year gas air conditioning unit. A number of the latest models of automatic gas water heaters, CP ranges, Servel refrigerators, home laundries and clothes dryers supplemented the kitchen displays.

Other gas boosters at the fair included a representative group of appliance manufacturers; the Los Angeles county school exhibit, which featured an all-gas kitchen in the home-making section; and the Master Bakers Retail Assn. display, in which an all-gas model bakery was operated.

HOUSTON NATURAL GAS CORP. and its cooperating dealers inaugurated a water heater campaign on Sept. 1 with the publication of the first of a series of special ads in selected newspapers. Tagged "The Magic Fountain That Never Runs Cold," the program is similar to the "For Hot Water Magic, Gas Has Got It" sales drive held last spring.

An important incentive which proved itself during the last water heater campaign is the gas company's financing plan. The usual cash down payment is waived, and a long-term contract is payable on the gas bill.

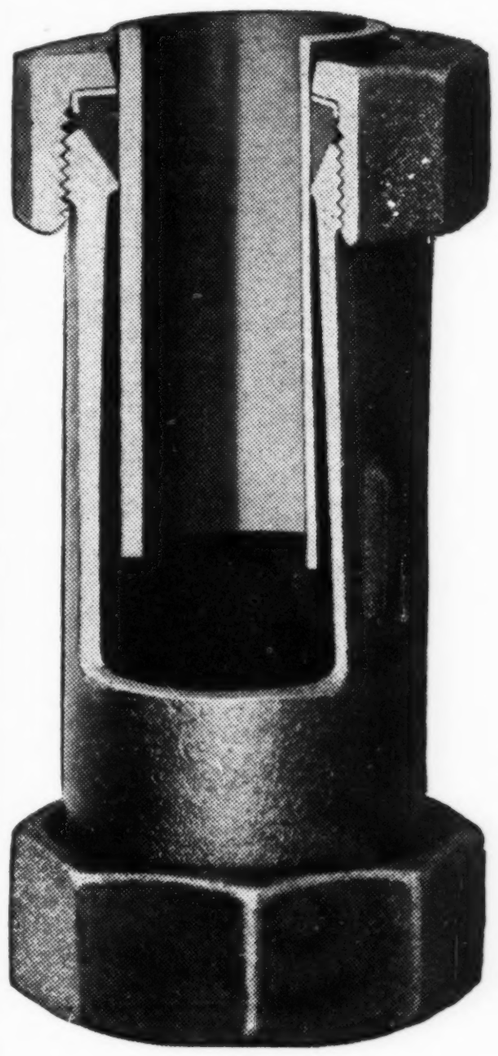
A booklet outlining details of the Magic Fountain program has been prepared and distributed to dealers.

GAMA REPORTS a new promotional possibility: use of AGA's "Reference Manual of Modern Gas Service" by manufacturers. One appliance manufacturer, according to a GAMA report, has bought 40 copies of the manual and distributed one to each of his district representatives for use as a promotion piece. Leigh Whitelaw, GAMA's managing director, suggests that manufacturers may find it worth while to distribute the manual to their sales organizations.

ONE OF THE MOST recent converts to television as an advertising medium is the East Ohio Gas Co., Cleveland, whose "Through the Kitchen Window" went on the air over NBC's WNBK Aug. 9. Originated in a specially constructed studio in the East Ohio building, which has been called the industry's most up-to-date studio, the program uses as its set a complete working kitchen. Featured is Miss Louise Winslow, home economist, who at present is giving cooking demonstrations on the program. A clear, easily followed demonstration of the preparation of a family dish or an entire meal is the central attraction.

GAMA has reminded participants in the "Court of Flame" campaign that prizes for the entire year's sales will be awarded at the conclusion of the current quarter. Any sale of a tagged automatic gas water heater since Jan. 1, 1949, will be counted, and participation in the contest during the preceding three quarters is not necessary to become eligible for the grand prizes, which are headed by two Buick super sedans.


# NORMAC
## COUPLINGS, SLEEVES and FITTINGS

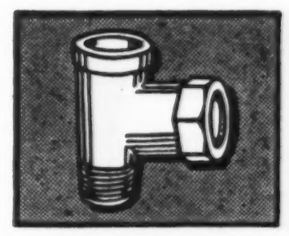


***for maximum deflection, ease of "stabbing," complete confinement of the rubber!***

**So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.**

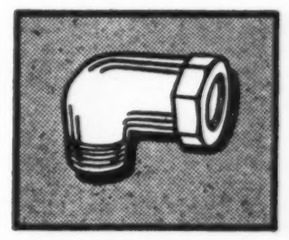
**NORMAC COUPLINGS are made with 5" centers in all sizes. NORMAC SLEEVES are identical in design except that they are made with 10" centers. Nuts and gaskets are interchangeable.**

### COMPRESSION-END SERVICE "TEE"



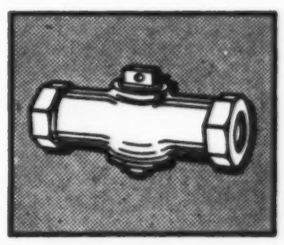
**First fitting of this type ever produced with full coupling depth and special threads on male end to prevent dropping into old hand taps when used to replace standard threaded fittings.**

### COMPRESSION-END SERVICE "ELL"



**Extra depth makes it possible to "stab" pipe into stops and without measuring, pull back a safe distance to allow ultimate deflection eliminating possibility of strain against tap in main.**

### COMPRESSION-END IRON BODY BRASS CORE SERVICE STOPCOCKS



**End the necessity of threading on the job plus the elimination of the threads themselves — combining all the advantages of NORMAC COUPLINGS and the best in stopcock design. 2½" coupling depth on each end.**

### NORMAC BRASS FITTINGS DEVELOPED IN 1939 FOR USE WITH COPPER TUBING

**Our complete line of brass fittings can be used either on new installations or where copper is run through old steel pipe in large or small openings. The center to end dimensions of NORMAC TEES correspond with old malleable iron fittings. This feature is extremely important in the use of these fittings in one foot openings where the tubing must line up with the steel which has been removed.**

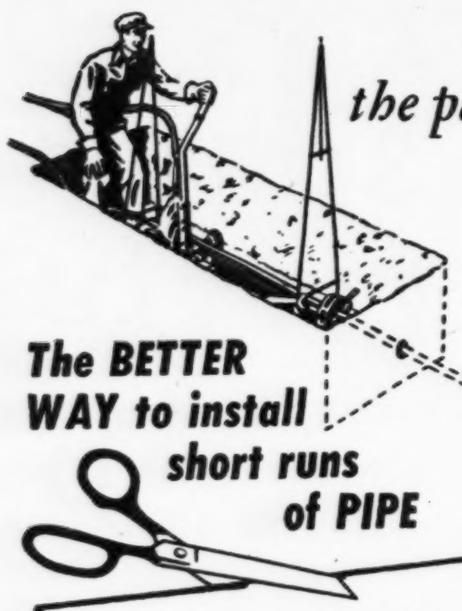
*Write for the NORMAC CATALOG of Gas Distribution Equipment*

**NORTON-McMURRAY MFG. CO.**

**39 SOUTH LA SALLE ST. • CHICAGO 3, ILLINOIS**

**Couplings • Meter Bars • Sleeves • Cocks • Bell Joint Clamps • Service Tees & Ells**

# HOW TO



*keep out of the pavement breaking business!*

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*from a 2′ 6″ by 7′ 6″ trench Hydrauger BORES a straight open 200′ long hole. Bore diameters — 2″ through 24″.*

**The BETTER WAY to install short runs of PIPE**

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Without obligation, please send me a copy of Hydrauger Bulletin which shows the low costs and high speeds of the Hydrauger.

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*Earth Boring Tool*

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**TO PROMOTE SALES . . . Visually demonstrates advantages of better constructed, better insulated ovens.**

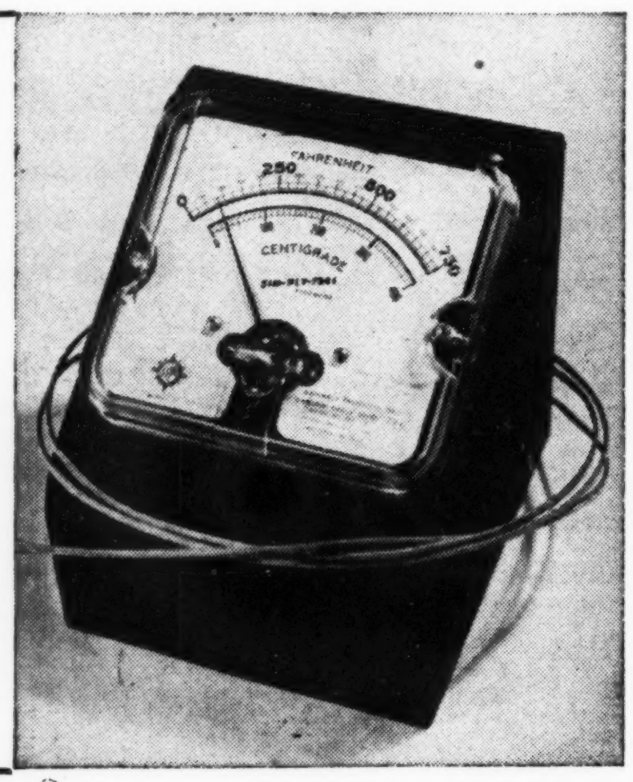
**TO SPEED SERVICE . . . SAVES up to 30 minutes on service and adjustment of oven controls.**

**The SIMPLYTROL Oven Thermometer for accurate reading of oven temperature without opening oven door. Reads up to 750°F, or 400°C.**

**Model 1654-A, illustrated.....$21.00**
(Complete with thermocouple wire)

*Order today, or write Dept. G-1*

**ASSEMBLY PRODUCTS, INC.**
**CHAGRIN FALLS, OHIO**






# performance

*where it counts*

*in the field*

*thats...*

**captan**

*the Natural Gas Odorant*

NATURAL GAS ODORIZING CO., INC.
P. O. BOX 2464 HOUSTON 1, TEXAS

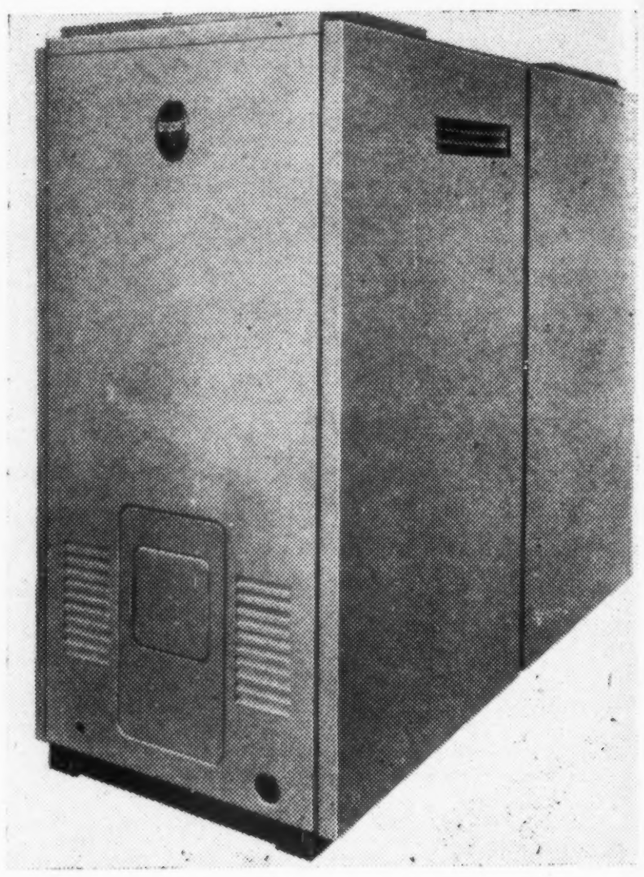

# NEW PRODUCTS

## Air Conditioner

BRYANT HEATER DIVISION, Affiliated Gas Equipment Inc., Cleveland, Ohio.

MODEL: 576 All-Weather 3-ton conditioner.

DESCRIPTION: This model features controlled humidity for summer operation through use of a "reheat" cycle, patented control circuit, simple seasonal changeover, and Fiberglas insulation. The two-stage burner



control permits a low-stage and reheat input of 30,000 Btu/hr and a high-stage input of 150,000 Btu/hr.

During summer operation a squirrel cage-type blower draws air into the unit through a cleanable air filter, through a series of coils where lowered temperatures extract excessive moisture, and then forces the cool dry air through the heat exchanger. It is tempered by reheat, if necessary, to a preselected temperature and delivered to the conditioned area.

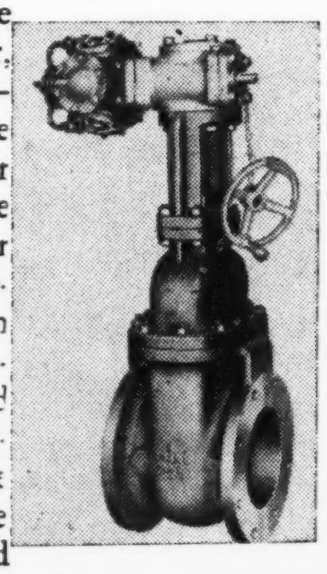
With the selector switch set for winter operation, air is drawn through the filter, forced through the heat exchanger where it is heated and humidified by means of an evaporative-type, plenum-mounted humidifier.

## Valve Operator

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.

MODEL: Fluid-motor operator for gate valves.

DESCRIPTION: The motor unit — motor, gear box and yoke — is bolted to the valve bonnet and the motor operates the valve stem through the gear box. The motor derives its power from five flexible diaphragms mounted radially about an eccentric on the drive shaft. When the valve gate reaches the end of its travel in either direction, the motor merely stalls, still under pressure. There can be no leakage, and shutoff devices are un-



# This NEW Liquid Filled GAS SAFETY PILOT

## in combination with Solenoid Gas Valve gives gas heating new SIMPLIFIED INSTALLATION

**TYPE 2532**
**Combination Valve and Pilot**

## ...brings you these outstanding features:

- Simplified wiring — easier installation.
- Positive safety — prevents flow of gas in event of pilot flame failure.
- Positive valve closure — individually ground and lapped valve and port.
- High plunger force — special design assures positive opening and closing without sticking or sluggish action.
- Available with or without manual reset for use in event of power failure.

*Write for complete catalog of White-Rodgers Gas Controls*

**TYPE 3020**
**Liquid-filled safety pilot, actuates S.P.S.T. electric switch. Available with universal mounting brackets, 30" capillary, angle or vertical fittings.**

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ELECTRIC CO. ST. LOUIS 6, MO.

FOR REFRIGERATION · HEATING
AND AIR CONDITIONING

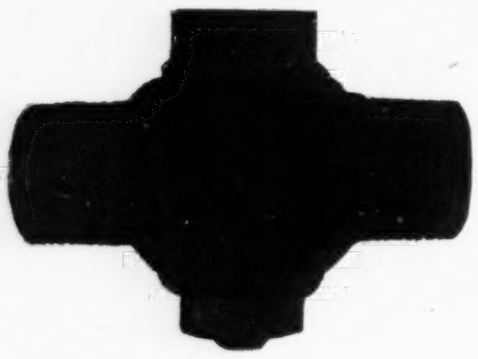
*Where RELIABILITY is essential*

**WELSBACH** *is specified*

**G-490**

**HEAVY BRASS SERVICE PATTERN**

**High Pressure Roundway I. P. Male**
**Sizes: 3/4"—1"—1 1/4"**



**Also,**
**G-491—High Pressure Roundway Male and Female**

**For many years, the gas industry has learned to rely on Welsbach's Kitson Division for top quality ground key products.**

**The heavy service stop pictured here is but one of the many Welsbach-Kitson gas stops giving you and those you serve continuous satisfaction. For good performance, rely on Welsbach!**

*KITSON DIVISION*

**THE WELSBACH CORPORATION**
**1500 Walnut St. Philadelphia 2, Pa.**



# KINETIC

*A New Webster*

## GAS BURNER

- **Designed for LOW GAS PRESSURE**
- **Will Operate at ONE POUND**
- **Will TURN DOWN to ½" Water**
- **Fires a SCOTCH MARINE BOILER without a dutch oven or refractory lining**
- **Will operate through a FIRE DOOR**
- **Will NOT VIBRATE**
- **Draft Loss VERY LOW**
- **This Gas Burner is available in ANY SHAPE and SIZE.**

*For KINETIC BURNER Information Write—*

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**P. O. BOX 2168**
**TULSA, OKLAHOMA**



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**GAS CHANGE-OVER SERVICE**

LET our experienced gas conversion specialists save you time, cost and trouble on every gas change-over project—for natural, manufactured or LP-gas. Our comprehensive service includes:

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AGC

**ROCKEFELLER CENTER**
**630 FIFTH AVENUE**
**NEW YORK 20, N. Y.**

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necessary. The valves can be operated by a wide range of liquids or gases at pressures from 40 to 300 psi. A handwheel is furnished for manual operation in the event of pressure failure. Valves equipped with the new fluid-motor operator are available in most types of Crane iron-body gate valves in sizes from 4-in. to 30-in.

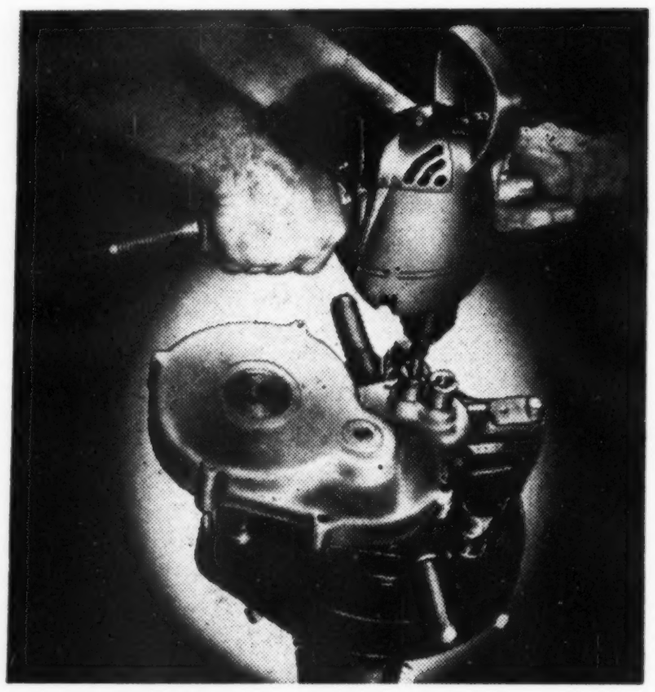
PRICES 12% to 20% below the market for comparably equipped competing ranges were announced recently by Detroit-Michigan Stove Co. on a new line of Detroit Jewel and Garland gas ranges. The new models feature Flo-line design with every corner rounded, even inside the oven. The Handee-Hi broiler rolls out as the broiler door is opened and can be lifted completely out of the range for cleaning. One of the models in the new Custom Master series is pictured here.

## Pipe Threader

MUNCIE GEAR WORKS INC., Muncie Ind.

MODEL: Porta-Drive portable pipe threader

APPLICATION: For handling up to 8-in pipe in a horizontal or vertical position or at an angle.



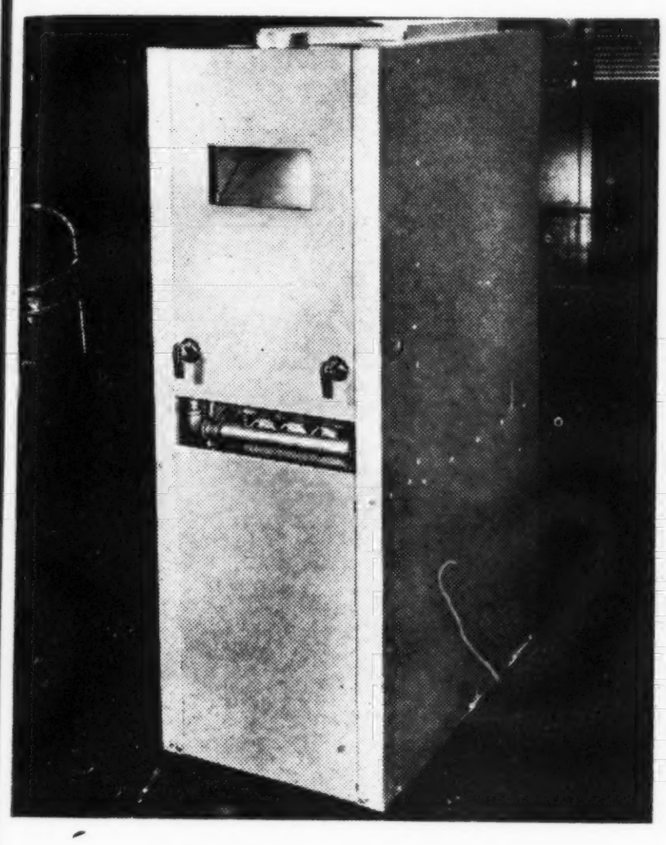
DESCRIPTION: This 14-lb threader is actually a 2 to 1 gear reduction unit which can be driven by any ½-hp electric drill and attaches to any standard set of dies by specially designed adaptor-yokes. An aluminum casing houses a bull gear and cold rolled spur gears, all sealed in grease. After threading is completed, insertion of the drill head into a "reverse" socket allows quick removal of the die.

## Air Conditioner

HENDERSON FURNACE & MANUFACTURING CO., Sebastopol, Calif.

MODEL: Hendy 60.

APPLICATION: This model is intended primarily for heating small homes with or without basements.



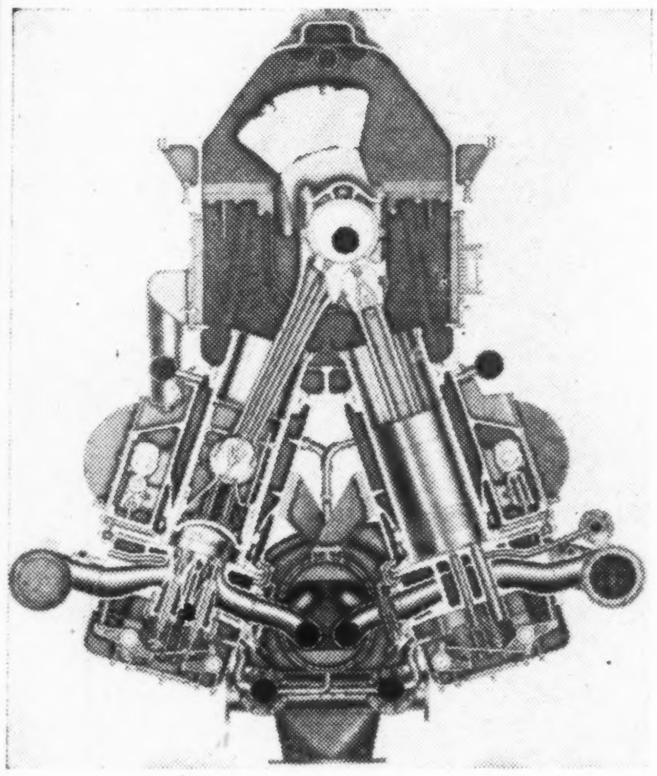
DESCRIPTION: This blower type, gas-fired, automatic winter air conditioner measures 18 x 30 in. and is 52 in. high. The furnace may be placed close to rear and side walls, such as in a closet or corner, since the vent is located at the top front. The AGA-approved model is assembled and tested at the factory. Special emphasis is being placed on economical installation, servicing and operation, the company says.

## Diesel Engine

COOPER-BESSEMER CORP., Mount Vernon, Ohio.

MODEL: LSV-16.

DESCRIPTION: Operating either as a conventional oil-burning diesel gas engine or as a gas-diesel unit, this engine is reported to



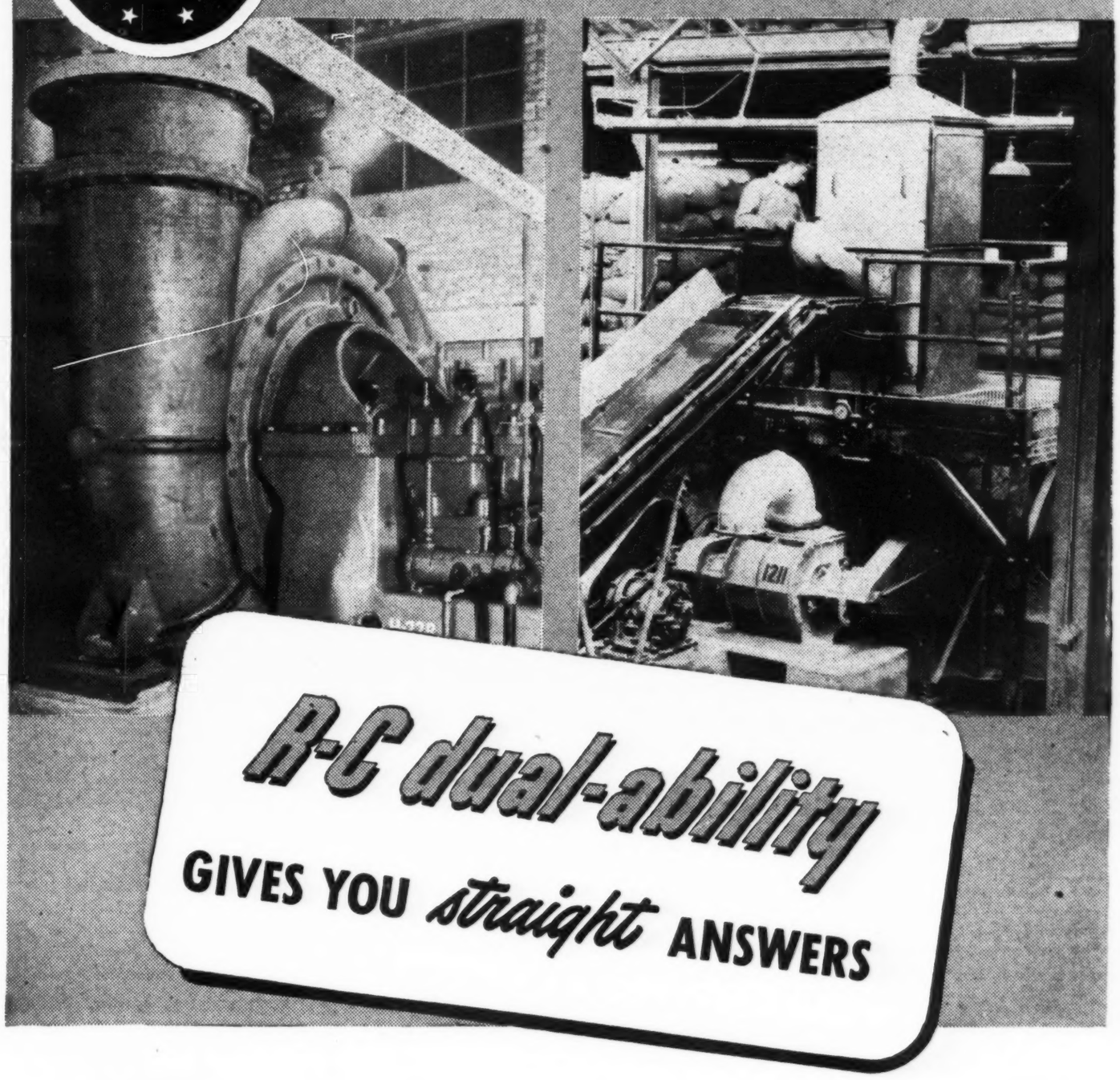
deliver more horsepower per cubic foot of space than any known comparable engine. Installations of the 16-cylinder units, designed to develop 3300 hp, have been made


CENTRIFUGAL

Motor-driven R-C Centrifugal Blower, 24" type OIB, capacity 19,600 CFM.

ROTARY

Type RCD Rotary Positive Blower, used for conveying. Capacity 1,500 CFM.



R-C dual-ability GIVES YOU straight ANSWERS

**Centrifugal or Rotary Positive? Which type of air or gas handling equipment is best suited to your needs? The answer depends upon the specific job—and you'll get the cold, unbiased facts from R-C *dual-ability*.**

**We can give you this *dual choice* because we build both —and we are the only blower manufacturers who do so. Further, our range of sizes, capacities, pressures and other characteristics is so wide that we can usually match or very closely approximate even exacting specifications.**

**By such fitting of equipment to the requirements of the job, you get superior performance, dependability and long life from your R-C units—the natural result of 95 years of blower-building experience.**

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BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

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## Gas Heating Products

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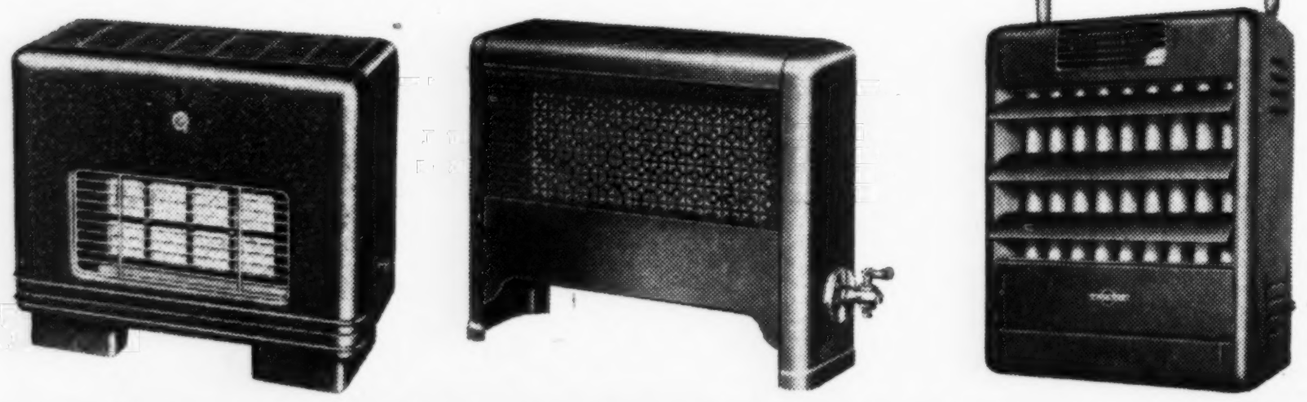


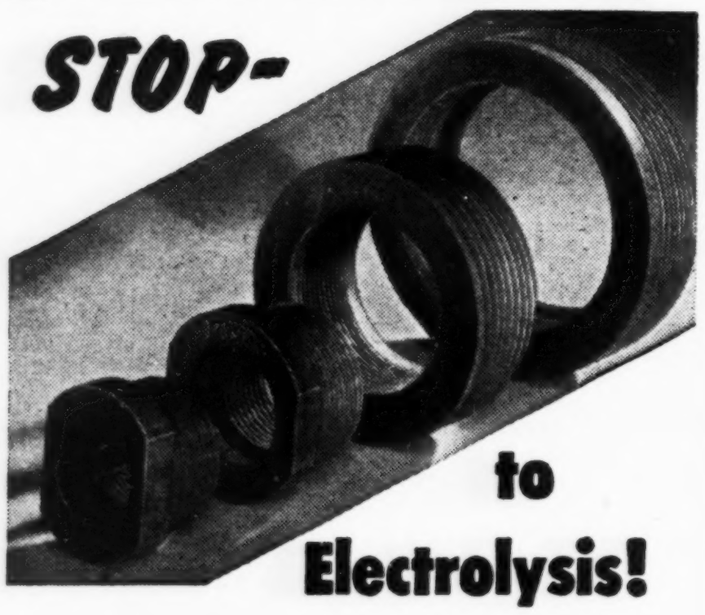
| VENTED CIRCULATORS | ENCLOSED RADIANT HEATERS | SUSPENDED FAN TYPE UNIT HEATERS |
|---|---|---|
| 20,000 to 60,000 B.T.U. Sizes<br>No. 7770 Series has Radiant Front Styling<br>No. 7780 Series has Closed Front Styling | 20,000 - 28,000 B.T.U.<br>No. 6190-D No. 6192-D<br>Other sizes and styles for rooms and fireplaces | 65,000 to 200,000 B.T.U. Sizes<br>For Domestic and Commercial uses |

**Write today for descriptive literature on this complete line that is made to sell . . . made to last . . . made to satisfy.**

**PEERLESS MANUFACTURING CORPORATION LOUISVILLE 10, KY.**



## FORMICA Bushings say STOP-



## to Electrolysis!

Give your pipe line longer life! Formica Bushings . . . used by leading gas companies . . . effectively insulate pipes, positively prevent electrolytic corrosion. They're tough and strong, have constant dielectric strength, and retain their dimensional stability even under extremes of temperature. Write for illustrated data sheet.

Seven standard sizes for ¼x½ to 3x4 reducing couplings; wrench-land styles in ¾" and 1" sizes . . . and all are ready for prompt delivery.

The Formica Co.
4681 Spring Grove Ave.
Cincinnati 32, O.

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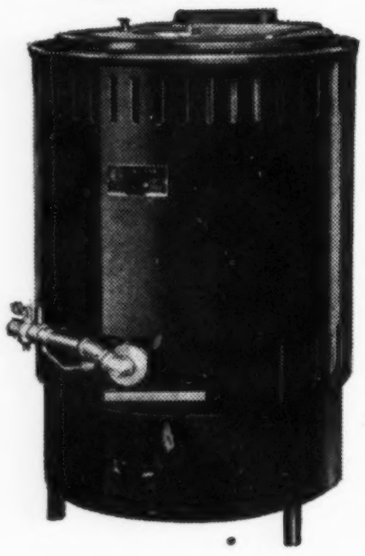

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**BUILDS BASE LOAD**

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**Much better than average MERCHANDISING PROFIT**

**A "MUST" for homes with automatic heat—needed in every home. Commercial size also available.**

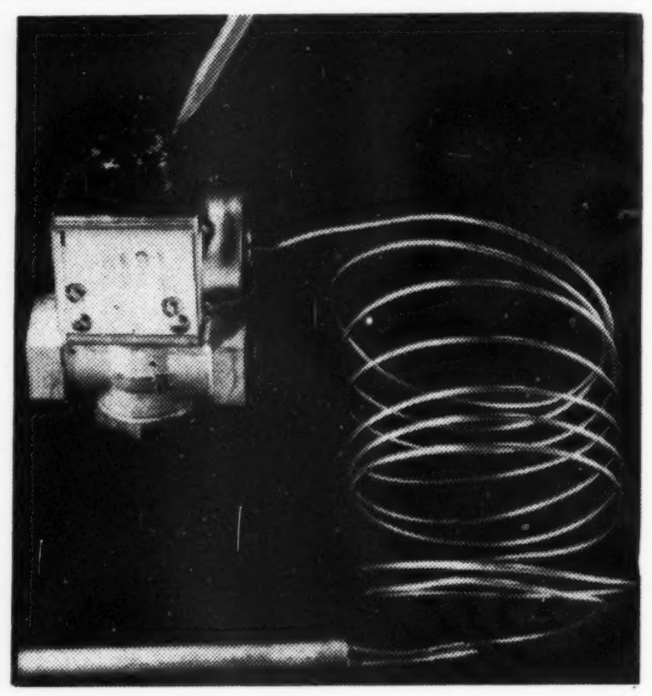
**INCINOR SALES MAKE FRIENDS FOR GAS COMPANIES**

**Write for details.**

**BOWSER, INC., INCINERATION DIVISION CAIRO, ILLINOIS**


in several large plants. The company plans to build both supercharged and atmospheric LSV-type engines in a 12-cylinder size, affording a total range from 1300 to 3300 hp.

The LSV engine is built with two banks of cylinders, 15½-in. bore and 22-in. stroke, driving a single crankshaft by means of articulated connecting rods. Other new features include unusually low bearing pressures, motor-driven pumps, dual superchargers, exceptionally low head room, and large 13½-in. diameter crankshaft.



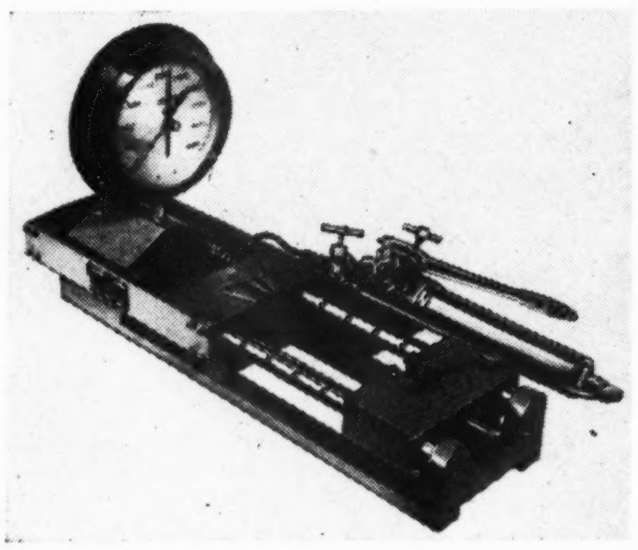
THE "MAGIC-HEET" is a new control device announced by A. O. Smith Corp., Toledo, Ohio, for use with its gas conversion burners and hot water boilers. The company reports that installation cost is very low and that service requirements are negligible because of simplicity of design and operation. They feel that the control is the answer to the "cold 70" condition.

## Tensile Tester

STEEL CITY MACHINES INC., 8843 Livernois, Detroit, Mich.

MODEL: PO-40 portable tensile tester.

APPLICATION: Particularly adapted for testing pipe welds and other welds in the field, but it is also satisfactory for laboratory and shop testing.



DESCRIPTION: Capacity of this machine is 40,000 lb and it will make tests on specimens from 6 to 13 in. in length and up to ⅜ in. thick and 2¼ in. wide. Operation is hydraulic by means of a hand pump integral with base. The machine weighs slightly more than 200 lb and can be carried by two men. It is furnished with pump (which contains its own oil reservoir), dial gage, and one set of flat jaws. It is shipped completely assembled.

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## "GAS HAS GOT IT"— IF YOU'VE GOT THE GAS!

Your increased loads can be carried by manufactured gas. Here are some recommended methods and the equipment necessary to make them work:

**1.** Carbureted Water Gas From 500 to 700 B.t.u. — using coke and gas oil . . . coal and gas oil . . . coke and bunker oil . . . 100% soft coal and 100% bunker oil — (while maintaining set capacity).

REAL SAVINGS CAN BE OBTAINED BY PROCESSES AND EQUIPMENT WHICH ADEQUATELY USE LOW-COST, LOW-GRADE FUELS.

**2.** Oil Gas From 600 To 1200 B.t.u. — for natural gas peak shaving and emergency stand-by . . . for base load manufactured gas plants and high B.t.u. distribution (requires appliance conversions) . . . for base load manufactured gas plants for low or intermediate heating value B.t.u. distribution (does not require appliance conversions, may necessitate minor adjustments).

HIGH THERMAL OUTPUT PER DOLLAR OF INVESTMENT.

**3.** Hydrocarbon Reforming. Thermal and Catalytic Cracking Processes for reforming natural gas, propane, and other feeds.

NEW DESIGNS FOR HIGH CAPACITY, ECONOMICAL PERFORMANCE.

**4.** Liquefaction, Storage, and Regasification Of Natural Gas; 600 cubic feet of natural gas equivalent to one cubic foot of space!

LARGE NATURAL GAS STORAGE IMMEDIATELY AVAILABLE FOR USE.

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*GASMACO Engineers are available at all times to provide further information and advise you on your requirements:*

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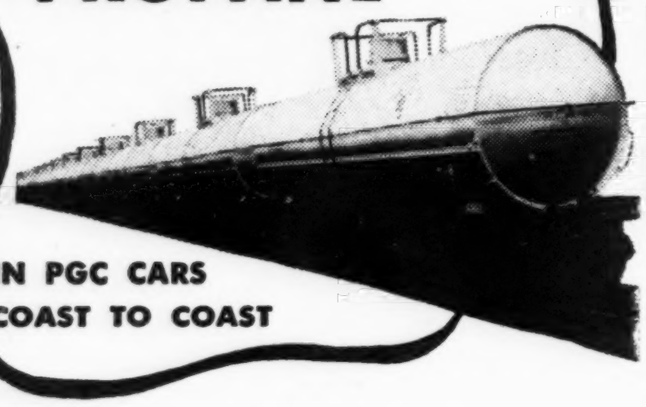
**Designers Fabricators Erectors**
**Gas Plant Equipment and Industrial Furnaces**

P.G.C.®

BUTANE . . .
PROPANE



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COAST TO COAST

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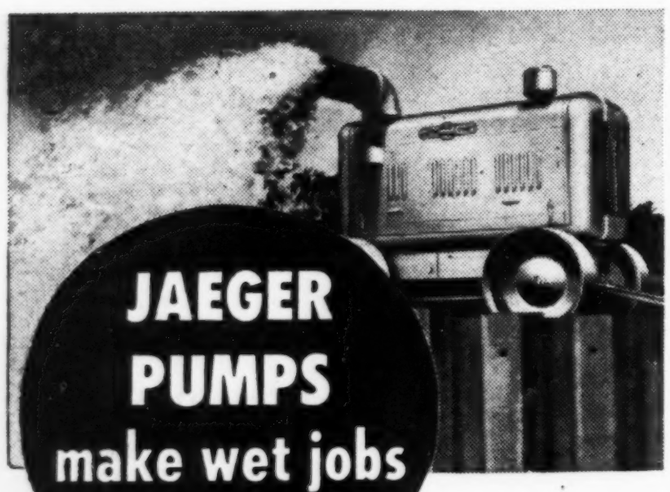
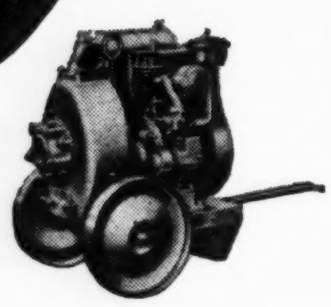
New 2" aluminum pump weighs 105 lbs., pumps 9000 gph . . . Gives high head performance for price of low head pump.



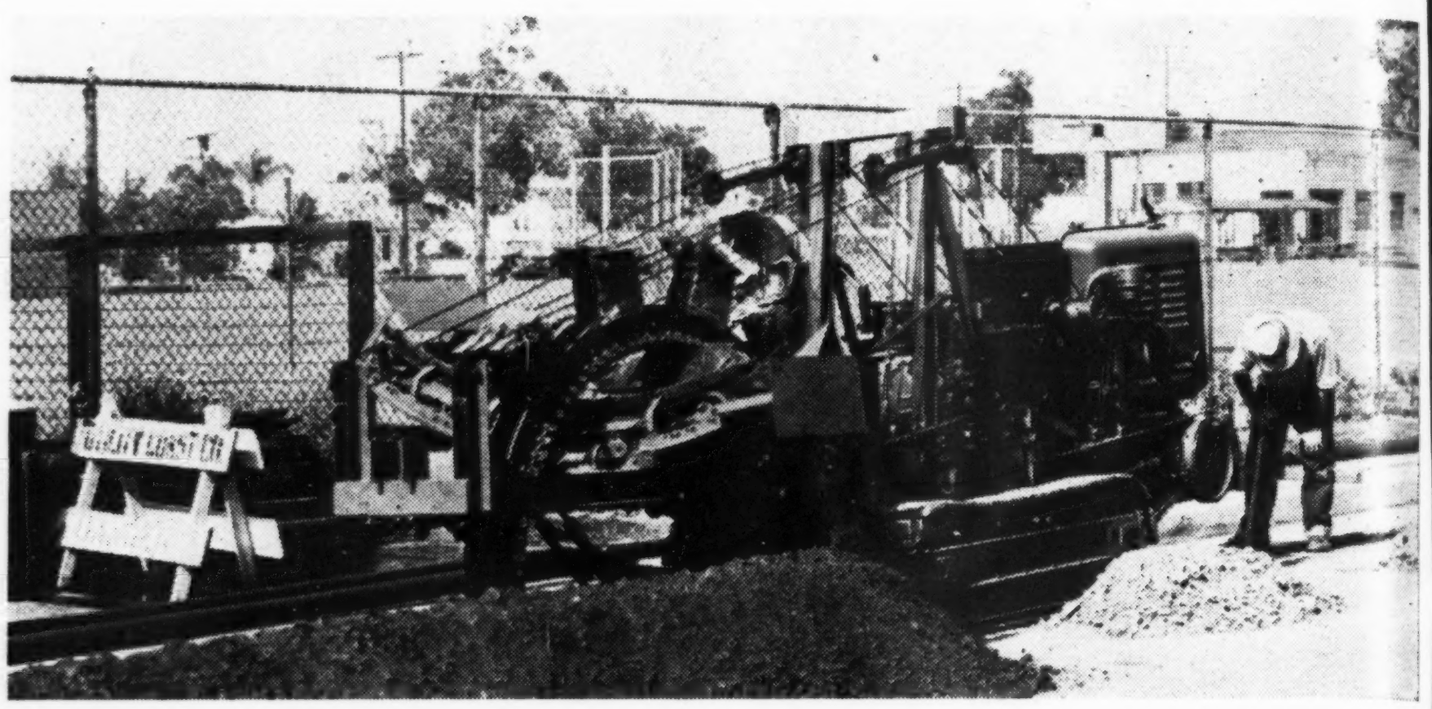
JAEGER PUMPS make wet jobs dry



Extra power and double priming action to de-water faster. Built to outlast cheaper pumps by thousands of hours.

Heavy duty 2" to 10" models for low or high head requirements. Super-Jet pumps for pressures to 275 lbs. Diaphragm and caisson pumps. Get catalog.

THE JAEGER MACHINE COMPANY
Columbus 16, Ohio



## Trencher

CLEVELAND TRENCHER CO., 20100 St. Clair Ave., Cleveland, Ohio.

MODEL: Baby Digger 92.

APPLICATION: Especially adapted for gas, water and sewer house services.

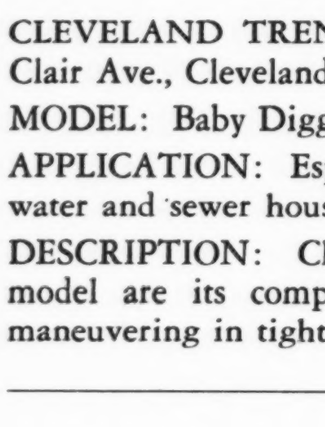
DESCRIPTION: Chief advantages of this model are its compact size, allowing easy maneuvering in tight places and quick moves on its own rubber-tired tilt-bed electric-braked trailer, and its ditch capacities—up to 5 ft deep and 10 to 20 in. wide.

Other features are clog-proof crawler tracks, operator-controlled power shift conveyor giving instant control of the spoil bank, patented Presto-Points for easy replacement of rooter teeth, and a crumbing shoe which gives perfect grading and clean trench bottom and which can be swung up and away to permit digging right up to foundations, etc.

## Service Cocks

WALWORTH CO., 60 E. 42nd St., New York, N. Y.

MODEL: High-pressure lubricated service cocks.




APPLICATION: For working pressures up to 125 lb on gas, oil, or water lines.

DESCRIPTION: These service cocks, which are described as being practically tamper-proof, are available in ¾-in. and 1-in. sizes. They have cast iron bodies and bronze plugs and are made with both screwed recessed ends and Dresser super service ends. The plug is always held against its seat in the body by a gland through resilient packing. The bottom of the cock is a continuous casting, and the top is closed by means of a screw-type bronze gland, which requires a special spanner wrench. Bodies and plugs are carefully fitted for tightness and are provided with a lubricant screw of cadmium-plated steel and a complete lubricant grooving system for pressure-sealed lubrication.

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EQUIPMENT
ENGINEERING
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AND
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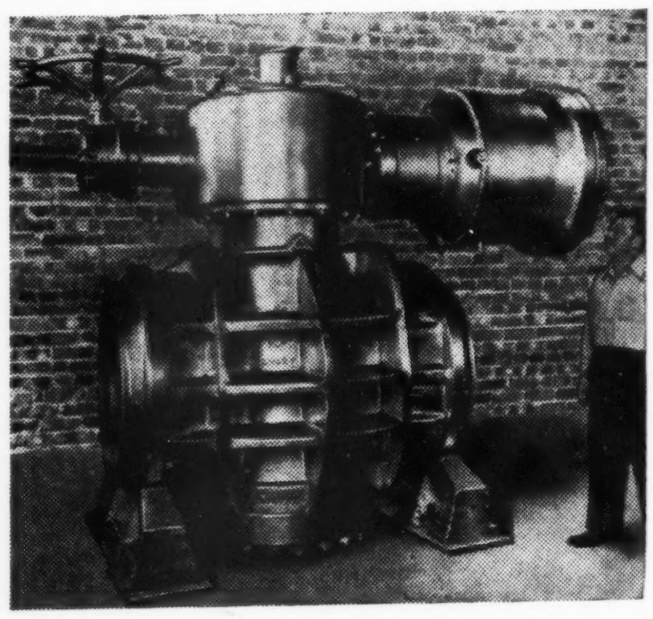

MORE THAN 1600 manhours were expended in the development of the first 15,900-lb lubricated plug valves of the type shown above. Twelve of the giant valves are being built and tested in the Nordstrom Valve plant of Rockwell Manufacturing Co. at Oakland, Calif., and will be installed on the initial section of Pacific Gas & Electric Co.'s 34-in. line from the Colorado river to the San Francisco bay area. The valve with cylinder operating unit is 81½ in. high and the end-to-end dimension is 59 in. Weight of the plug alone is 1000 lb. Maximum thickness of the body wall is 3 in. and of the throat wall, 3⅛ in.

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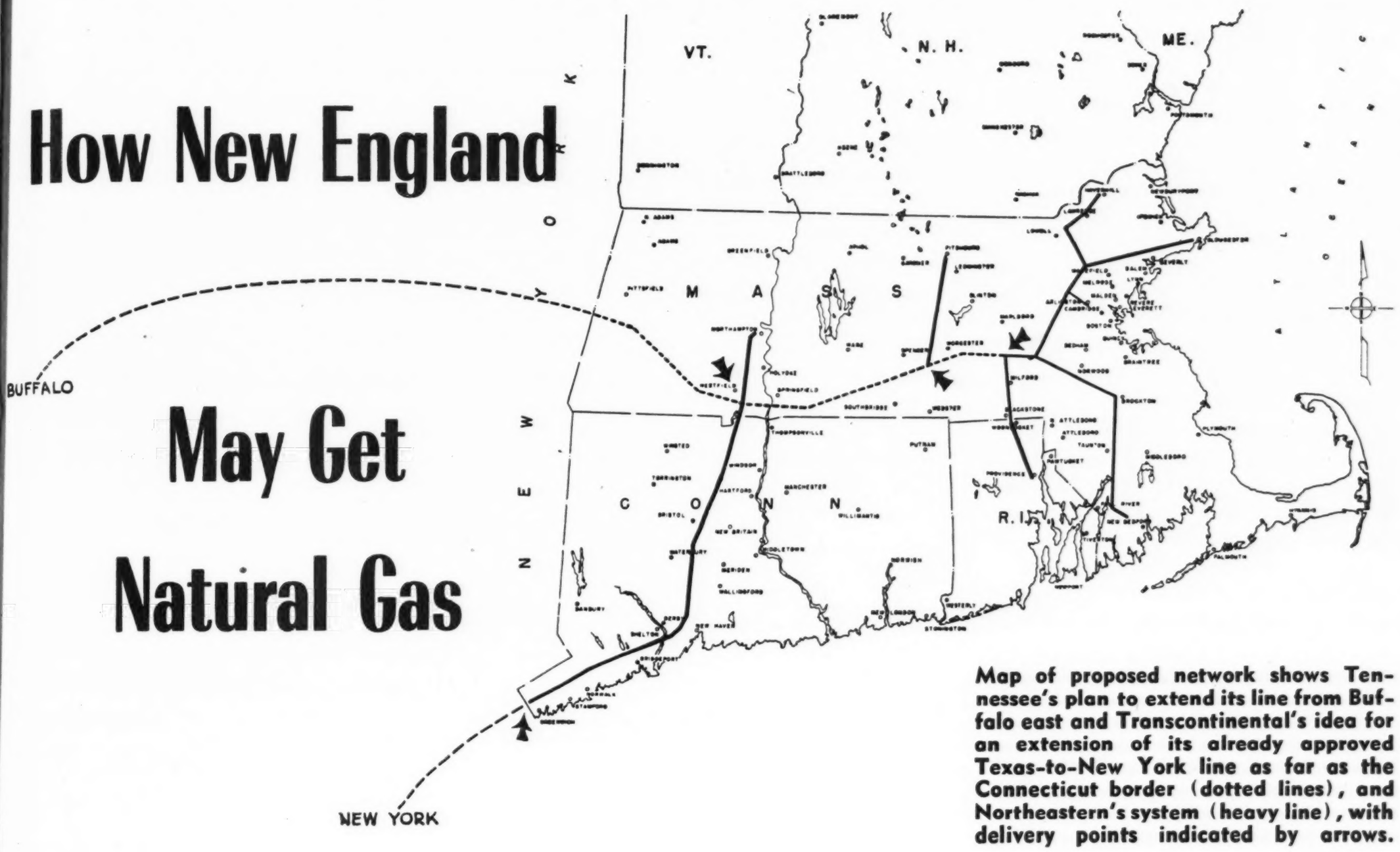
# How New England May Get Natural Gas




**Map of proposed network shows Tennessee's plan to extend its line from Buffalo east and Transcontinental's idea for an extension of its already approved Texas-to-New York line as far as the Connecticut border (dotted lines), and Northeastern's system (heavy line), with delivery points indicated by arrows.**

A plan by which New England may possibly get natural gas by late next year has been worked out and presented to the Federal Power Commission in a certificate application by Northeastern Gas Transmission Co.

Exclusive

Initial financing of the company has been undertaken by Tennessee Gas Transmission Co., of which Northeastern is now a wholly-owned subsidiary. Eventually it would be proposed to give New Englanders an opportunity to participate financially in the project. Northeastern would get its supply from Tennessee and from Transcontinental Gas Pipe Line Corp.

Northeastern has its head office in Boston and is authorized by its corporate charter to purchase, transport and sell natural gas at wholesale and is qualified to do business in the six New England states: Massachusetts, Connecticut, Rhode Island, Maine, Vermont and New Hampshire.

Importance of natural gas to the area is potentially very great. Various industries in recent years have moved away, but the coming of the ideal fuel might serve to start industry on the upgrade again.

It is known also that the possibility of natural gas teaming up in New England with ore from the newly discovered reserves in eastern Canada to build a New England steel industry is being studied, although no mention of this is made in Northeastern's application.

Tennessee Gas Transmission has had inquiries about natural gas service from a large number of New England utilities, and it didn't take long after announcement of Northeastern's plans for one important company to sign a contract.

This was Springfield Gas Light Co., which signed to provide natural gas in eight cities and towns in western Massachusetts. Sixty thousand customers are served by this company.

Charles G. Young, vice president and general manager of the Springfield company, described the economic importance of natural gas to New England as "immeasurable." Mr. Young said that at the start Springfield Gas Light expects to take about 5 MMcf of gas daily from the pipeline, mixing it with manufactured gas. He said this volume might be increased and reach possibly 15 MMcf in a few years.

Northeastern has asked the FPC for a certificate to construct and operate a pipeline system and facilities which would have a delivery capacity, without compression, of about 350 MMcf per day and consist of the following:

1. About 511 miles of pipeline and laterals, ranging from 20-in. down to 3-in., of which about 333 miles are shown in the accompanying system map.
2. Suitable sales meter, check meter, and regulator stations.

Northeastern estimates 350 MMcf of natural gas per day will meet requirements of the six New England states for from three to five years after service is initiated.

The company hopes to begin delivery of natural gas in New England late next year (1950). It proposes to sell the gas to privately or publicly owned gas pipelines or distribution systems, the facilities of which would connect with extensions or laterals constructed by Northeastern from its own pipeline system or from the system of Tennessee Gas Transmission. The sale would take place at points of delivery at or near city gates or town borders in any of the six New England states, an area of more than 6,146,000 population, with more than 1,536,000 consumers of manufactured gas.

Northeastern anticipates that to begin with some gas distribution systems will supply straight natural gas to their customers and others will use it as a raw material for production of manu-

**By EDWARD TITUS**

factured gas. Still others will use it to enrich manufactured gas, and this will have the effect of increasing the capacities of their distribution system without substantial conversion. The applicant predicts that as their distribution systems can be converted many company purchasers will change from manufactured gas or mixed gas to straight natural.

The map shows the main transmission pipeline and principal laterals designed to enable Northeastern to supply most of the heavily populated areas of New England.

Northeastern states it plans to extend this system to other New England areas if and when the requirements of natural gas of such areas are sufficient to make construction and operation of the necessary laterals economically feasible.

Northeastern has entered into two gas purchase contracts with Transcontinental, each of which provides for sale and delivery to Northeastern of up to 50 MMcf of natural gas per day at a point near Greenwich, Connecticut. Both contracts are for 20 years. One has a cancellation provision which may be made effective by either party on two years' notice.

Transcontinental on Sept. 9 filed an application with the FPC for authorization to increase its total capacity from 340 MMcf to 505 MMcf per day, and to extend its transmission system from New York City to the New York-Connecticut state line.

Northeastern anticipates that at least 50 MMcf or possibly the entire 100 MMcf per day to be obtained from Transcontinental will be available by the fall of 1950. By then Northeastern would expect to have facilities built to transport and deliver these quantities of gas to the Connecticut market and some additional points.

The agreement of Northeastern with Tennessee Gas Transmission provides for delivery of such quantities as may be required—in addition to the gas to be purchased by Northeastern from Transcontinental—to supply all of Northeastern's New England markets.

Under its application to the FPC Tennessee would expect to deliver gas in New England by the fall of 1951.

Initially Northeastern proposes to purchase and receive from Tennessee about 120 MMcf of natural gas per day, to be delivered at various points in Massachusetts.

Thus Northeastern would anticipate purchasing at first from its two sources about 220MMcf per day. The company considers this adequate to meet its market demand during the first two to three years after start of service.

Northeastern would be provided with operational flexibility, resulting from two complementary and inter-connected sources of supply. Each would extend, independently of the other, from the producing regions of Texas and Louisiana to New England.

This is declared desirable, in view of the distance of New England from the producing regions. In case of interruption of either supply, the other would remain.

Estimated over-all capital cost of all the facilities proposed in Northeastern's application is $17.6 million.

Total annual revenue expected by Northeastern and total annual operating expenses, including depreciation and taxes, but exclusive of interest and other non-operating expenses, after the facilities are in operation, are estimated as:

| | |
|---|---|
| Total annual operating revenue.. | $27,700,000 |
| Total annual operating charges.. | 26,800,000 |
| Net annual operating income.. | $ 900,000 |

Northeastern proposes to charge a uniform demand and commodity rate for all gas supplied to its gas utility customers throughout New England.

The proposed demand charge will be $3.75 per MMcf and the proposed commodity charge 25 cents per MMcf.

The system in New England would be supervised and operated by Northeastern's own employees, and no service or management contract is planned.

Alexander Macomber of Boston, long prominent in New England utility and civic circles, as well as in the utilty industry throughout the country, is chairman of the board of the newly formed Northeastern Gas Transmission Co.

Five of the seven directors authorized have been announced. In addition to Mr. Macomber they are Daniel H. Morrissey, attorney of Providence, R. I.; Charles H. Tenney II, Boston utility executive; R. K. Hanger, a Tennessee Gas director; and Gardiner Symonds, president of Tennessee.

In addition to the Northeastern proposal, there have been published reports that one or more other proposals might be made.

If Northeastern is granted a certificate and carries out its intention of having natural gas in New England by late next year, this will be a year earlier than previously anticipated.

## TENNESSEE'S ROLE IN THE PLAN

THE part of the natural gas which Northeastern Gas Transmission Co. would secure from Tennessee Gas Transmission Co. would be brought from Buffalo to a point near Worcester, Mass., by a proposed line for which Tennessee has filed application.

The estimated overall capital cost of all the new facilities proposed in this application is about $93,976,000, as follows:

| | |
|---|---|
| New compressor stations and additions to present stations | $20,530,000 |
| Loops and main line extension | 67,446,000 |
| Lateral lines and other facilities | 1,425,000 |
| Meter stations | 100,000 |
| Contingencies | 4,475,000 |
| TOTAL | $93,976,000 |

Total revenues expected from the proposed new facilities and total operating expenses, including depreciation and taxes, but exclusive of interest and other non-operating expenses, are estimated as follows:

| | |
|---|---|
| Total operating revenue | $89,755,000 |
| Total operating charges | 66,012,000 |
| Net operating income | $23,743,000 |

At the time of the application for the line to New England the authorized designed delivery capacity of Tennessee's pipeline system was approximately 1060 MMcf per day. In the application for the line from Buffalo to Central Massachusetts, Tennessee is seeking a certificate to construct and operate facilities necessary to increase the designed delivery capacity of its system by an additional 200 MMcf per day, bringing the total designed delivery capacity to approximately 1,260 MMcf.

The new facilities needed to accomplish the increase would consist of the following:

1. Construction of about 542.9 miles of loops tween San Salvador Field and Compressor along Tennessee's present main line be- Station No. 14.

| *Description* | *Approximate Length - Miles* |
|---|---|
| 30-in. OD | 448.5 |
| 26-in. OD | 69.9 |
| 24-in. OD | 24.5 |
| | 542.9 |

2. Construction of about 383 miles of 26-in. OD main line, beginning at the temporary terminus of Tennessee's authorized Buffalo extension in Erie county, New York, and extending easterly to a point in Massachusetts.
3. Installation in Tennessee's existing or authorized compressor stations of new compressor units aggregating 51,200 horsepower, together with other related facilities, and construction of four new compressor stations totalling 34,000 horsepower, as follows:

| *Station No.* | *Approximate Location* | *Horsepower* |
|---|---|---|
| 214 | Southeastern Ohio | 10,000 |
| 221 | East Central Ohio | 10,000 |
| 228 | Northeastern Ohio | 9,000 |
| 247 | Vicinity of Buffalo, N. Y. | 5,000 |
| TOTAL | | 34,000 |

4. Construction of about 75 miles of 8-in. miscellaneous lateral lines to connect additional gas supply to Tennessee's pipeline system.
5. Construction of check and sales meter stations on the pipeline system.

## TABLE 1. TENNESSEE'S EXPANSION PROGRAM

| Particulars | In Service | Authorized And Under Construction | Total In Service and Authorized | Applications Pending | Total |
|---|---|---|---|---|---|
| Delivery capacity—MMcf per day pipelines (miles) | 615 | 445 | 1060 | 200 | 1260 |
| *Main Transmission Line—* | | | | | |
| 16-in. Rio Grande valley to Corpus Christi, Texas | 99 | .... | 99 | .... | 99 |
| 24-in. Corpus Christi, Tex. to Kenova, W. Va. | 1180 | .... | 1180 | .... | 1180 |
| 20-in. Kenova, W. Va. to Cornwell Station, West Virginia | 85 | .... | 85 | .... | 85 |
| 26-in. Greenup, Ky. via eastern Ohio, to Buffalo, N. Y. | .... | 395 | 395 | .... | 395 |
| 26-in. Buffalo, N. Y. to Worcester, Mass. | .... | .... | .... | 383 | 383 |
| | 1364 | 395 | 1759 | 383 | 2142 |
| *Loop Lines—* | | | | | |
| 24-in. Additional second, third and fourth lines parallel to main transmission line above | 190 | 35 | 225 | 24 | 249 |
| 26-in. | 703 | 96 | 799 | 70 | 869 |
| 30-in. | 186 | 1011 | 1197 | 449 | 1646 |
| 31-in. | 102 | .... | 102 | .... | 102 |
| | 1181 | 1142 | 2323 | 543 | 2866 |
| *Extension and Field Lines—* | 199 | 406 | 605 | 75 | 680 |
| Total pipelines | 2744 | 1943 | 4687 | 1001 | 5688 |
| Compressor Stations— | | | | | |
| Number of stations | 15 | 2 | 17 | 4 | 21 |
| Rated horsepower—in thousands (new stations and additions to existing stations) | 221.4 | 120.4 | 341.8 | 85.2 | 427 |

Tennessee proposes to use the facilities sought to make natural gas available not only to companies in the New England states, but also to some in Ohio and New York.

Among the companies which have inquired for natural gas service are The Lake Shore Gas Co., The Lake County Gas Co. in Ohio and the City of Painesville, Ohio. In New York State the New York Power & Light Corp. has made similar inquiry.

In New England Tennessee has had conversations with many manufactured gas companies in regard to natural gas service, and lists the following as among those who have inquired:

*Massachusetts:* Brockton Gas Light Co., Cambridge Gas Light Co., Fall River Gas Works Co., Lowell Gas Light Co., Lynn Gas & Electric Co., Springfield Gas Light Co., Taunton Gas Light Co., Worcester Gas Light Co.

*Connecticut:* The Bridgeport Gas Light Co., City of Norwick Gas & Electric Department, Hartford Gas Co.

*Rhode Island:* Blackstone Valley Gas & Electric Co.

*New Hampshire:* Gas Service, Inc., Manchester Gas Co., Concord Gas Co.

*Maine:* Portland Gas Light Co.

In addition to the manufactured companies, several municipalities and state commissions have indicated strong interest in receiving natural gas for their areas.

The parts of Ohio, New York State and New England which are now served by manufactured gas and which Tennessee proposes to serve with natural gas have a population of 6,839,000, with approximately 1,702,000 domestic, commercial and industrial customers.

Tennessee also proposes to provide additional gas to existing customers or their affiliates along the route of its present line. In this connection capacity has been provided in the proposed facilities increasing deliveries to United Fuel Gas Co. in West Virginia and to New York State Natural Gas Corp.

The new facilities would be supplied partly from presently dedicated reserves in more than 70 fields in the Southwest, and partly from additional fields located along Tennessee's system in the Southwest.

Part of the cost of new construction would be financed from funds resulting from operations, the rest by sale of securities and bank loans.

Tennessee would extend the limits of its New York State zone eastward to include all the main line extension it proposes. The company would apply throughout this extended zone the proposed New York State zone demand and commodity charges. These are respectively $3.40 and 21.2 cents per Mcf. It is estimated Tennessee's annual gas deliveries would be about 415,482 MMcf after installation of the new facilities.

When completed into New England, Tennessee's system would be about 2142 miles long, 1759 miles of which already have been authorized by the FPC. The company has been steadily building up its pipeline system to serve New England since it made the first move looking toward that objective in October, 1947.

The line to Worcester, Massachusetts, would add the final 383 miles. The company's original pipeline from south Texas to West Virginia was put into operation in 1944 (*GAS*, November, 1944).

Tennessee is presently engaged in increasing the delivery capacity of its system from approximately 615 MMcf of natural gas per day on July 31, 1949, to a daily capacity of 1060 MMcf. For this capacity certificates have been granted by the Federal Power Commission.

The over-all status of the company's expansion program is shown in *Table 1*.

## HOW TRANSCONTINENTAL WILL TIE IN

LOOKING toward providing its share of the natural gas which would be distributed by Northeastern, Transcontinental Gas Pipe Line Corp. has applied to the FPC for the facilities which would extend its line through to the Connecticut border.

Part of the increased capacity would serve for deliveries to Northeastern, and part to increase deliveries to those with whom contracts were signed earlier. These customers include most of the principal gas utilities in and around the City of New York.

If the increased capacity is authorized, it will be accomplished by addition of 10 compressor stations, an increase of 137,120 hp of compressor capacity, and the change in size of sections of the authorized line, aggregating about 362 miles, from 26-in. to 30-in. pipe.

The application stated that construction of the new facilities would proceed simultaneously with the building of already authorized facilities.

The cost of additions, changes and extensions was estimated by the company as $50,386,000. Transcontinental proposed to finance the job by issuance of $32 million bonds, sale of $2,650,000 common stock through exercise of purchase warrants now outstanding, and by means of short-term bank loans.

The pipeline construction began in May in Laurel, Miss.; early in September 417 miles of pipe had been placed along the right of way; 325 miles of right of way had been cleared and graded; and 175 miles of pipe had been laid.

# The Chicago Liquefaction And Storage Plan

Fig. 1. Map of Chicago District's system showing physical relationship of proposed plant to various distributor connections. At bottom, left, gas is received from Natural Gas Pipeline Co. of America for delivery to the four companies through the Crawford line (into which the plant will feed) and the Calumet line. Both have termini at People Gas Light Co. stations.

**ACCORDING TO LATEST WORD from Chicago District Pipeline Co., construction on the liquefaction job is being delayed pending further engineering study. The plan as described herein was staff-written from FPC orders and exhibits and has received the commission's blessing.**

SIX million cubic feet per hour of natural gas will be made available to help solve the Chicago area's immense peak load problems when Chicago District Pipeline Co., supplier for People's Gas Light & Coke Co. and Public Service Co. of Northern Indiana—and others—completes its recently approved liquefaction and storage plant.

Exclusive

Chicago District, a Peoples subsidiary, will sell the gas to both the Chicago and Hammond utilities exclusively, at least under present arrangements. Public Service Co. of Northern Illinois, Chicago, and Western United Gas & Electric Co., Aurora, Ill., are excluded from the plan of distribution in accordance with their own wishes. High pressure underground storage in vessels, and propane installations which supplemented existing water gas production capacities have already put both these companies in the clear. In waiving claims to the added volumes to be made available, however, both these companies reserved the right to participate for peak shaving purposes if they change their minds before the plants are completed and in operation. They further modified the waiver to permit participation at such time as the plant's storage capacity may be increased beyond the presently designed 400 MMcf.

The plant, which is one of several steps already taken or yet to be taken by the Chicago companies to lick one of the most critical winter supply problems in the nation, will be the first full-scale liquefaction, storage, and regasification unit to be installed since the East Ohio Gas Co.'s plant exploded in Cleveland, Oct. 20, 1944. Well-planned safety precautions, a remote location, and the application of knowledge gained through years of pilot-plant studies are confidently expected to prevent a duplication of the Cleveland tragedy.

Several other moves have been made to strengthen the supply chain in the Windy City and environs. Chicago District Pipeline Co. has been at work since January, 1947, looping its two lines which serve its four utility customers. The so-called Crawford line, the northerly of the two which carry gas eastward from Joliet, Ill., was looped

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It has been established that the cost of reconditioning an uncoated or poorly coated pipe greatly exceeds the cost of a good initial installation.

However, when replacement is not necessary or feasible, other measures may be used to restore the line to operating condition.

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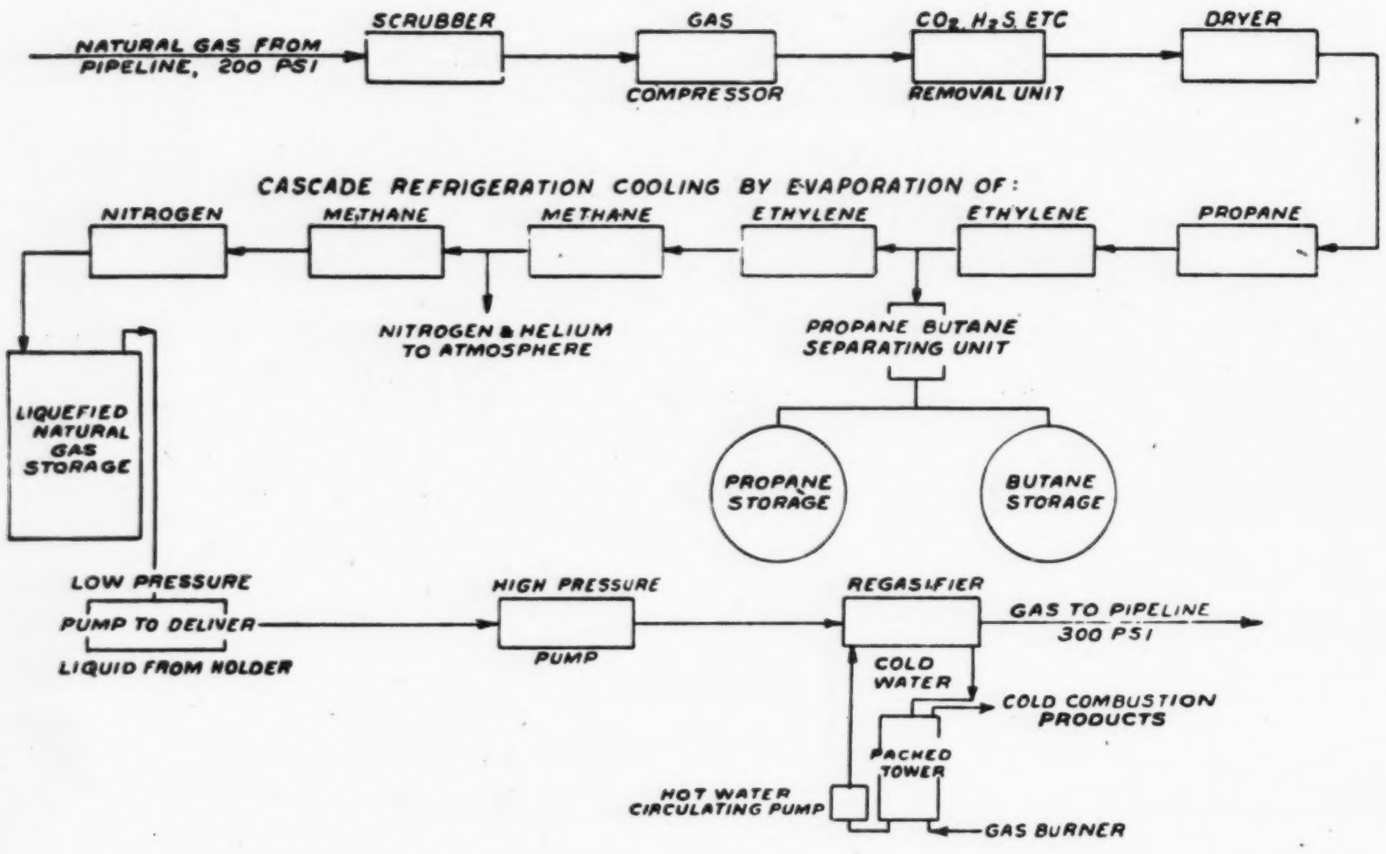



**Fig. 2. General flow diagram of Chicago District Pipeline's liquefaction, storage, and regasifaction plant.**

last November, and it is through this system that gas will be delivered to the liquefaction plant. *(See Fig. 1)* Its southerly line, the Calumet, is still in the process of being looped. Natural Gas Pipeline Co. of America, from which Chicago District receives gas for resale at a point near Joliet, completed a paralleling of its Panhandle field-to-Joliet pipeline in October, 1948. Peoples, which has this year built 51 by-product coke ovens to boost production of manufactured products, recently made headlines with the formation of a new subsidiary, the Texas-Illinois Natural Gas Pipeline Co., for the purpose of constructing a $100 million line with a 340 MMcf initial capacity to further add to its supplies.

One of the principal factors necessitating the liquefaction project, according to Federal Power Commission report, is that the combined capacity of Chicago District's Joliet-Chicago lines on a peak day will be 580 MMcf, which is 196 MMcf in excess of volumes which will be available to the company from Natural Gas Pipeline on a peak day. Off-peak liquefaction at the rate of 4 MMcf per day will fill the tanks in 100 days, discharging the regasified product at a rate of 6 MMcf per hour. Summertime operation of the liquefaction plant will be supplemented by off-peak-hour operation in the winter months.

Furthermore, the unit will also serve as standby in case of line breaks.

Northern Indiana, which is presently served through a connection of its own laterals at points on the Indiana-Illinois state line with the Calumet line, will be provided 50 MMcf of storage capacity in the new plant during the first year and an additional 50 MMcf starting one year later. Peoples, for now at least, will get the remainder.

In Chicago District's application to the FPC, it was pointed out that four feasible means existed for providing extra volumes of gas needed to ease the peak shave situation for Peoples and Northern Indiana: underground high pressure storage, additional natural gas pipeline flow capacity, manufactured gas capacity, and liquefied storage facilities. Consideration was narrowed to the single solution, liquefaction, on the basis of these two advantages: (1) Its particular adaptability to the supplying of gas to meet peak loads or other emergencies of limited duration, and (2) the low investment cost, compared with other means of storage of similar capacity which might be ready to go into operation within a reasonable length of time. *(See Table 1.)*

It is intended, first, to clean the gas to remove any entrained solids, then remove the $CO_2$ by conventional methods, and then dehydrate the gas to a dewpoint of approximately —70° F. The purified gas will be totally condensed and then subcooled by flashing. Nitrogen removal will be provided for in either a two-stage flash operation or by fractionation—it is entirely practical by either means. It is intended to store the liquid slightly sub-cooled.

The required refrigeration will be provided by a cascade cycle using propane and ethylene as refrigerants.

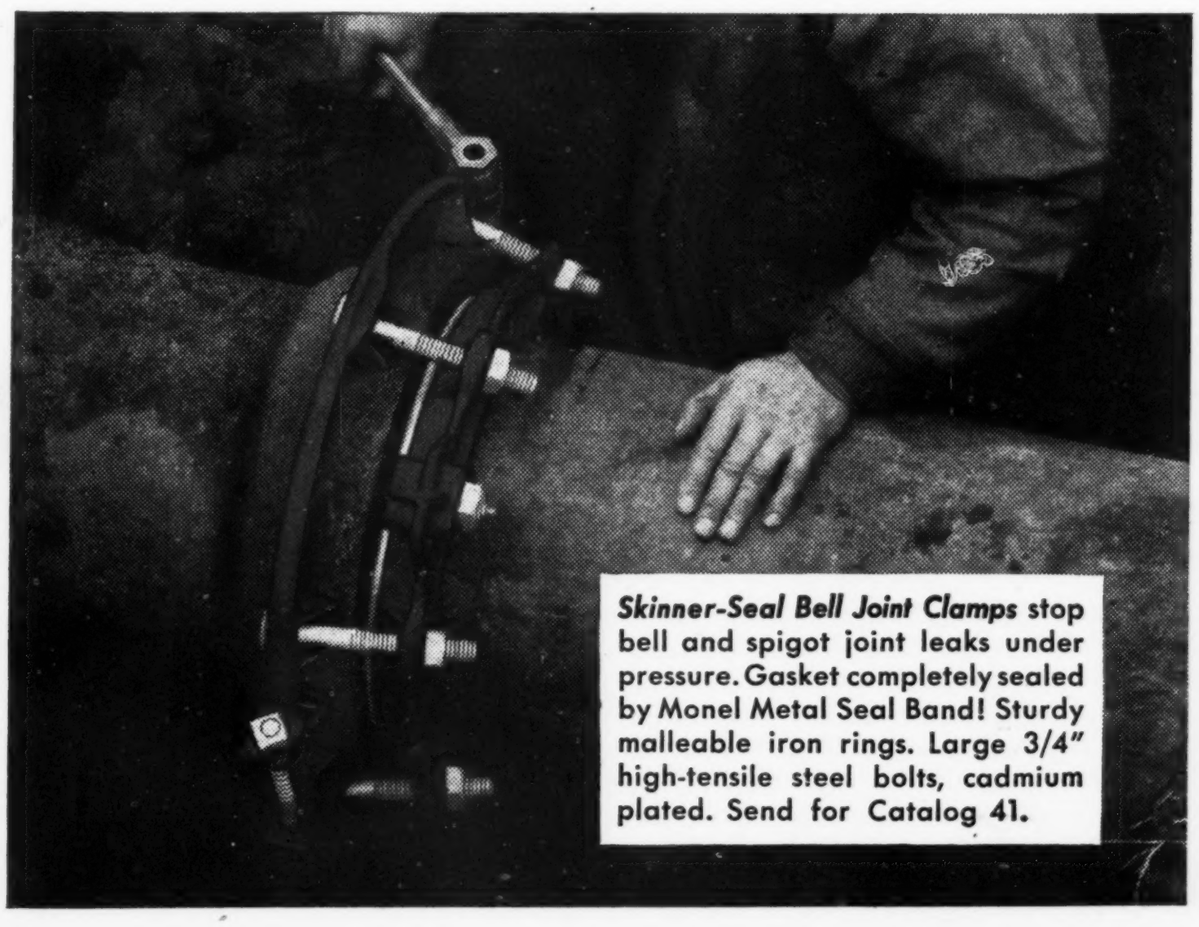
Regasification will be accomplished after the liquid gas has been repressured above pipeline pressure to permit the return of the gas to the transmission system. (See *Fig. 2.*)

The process for accomplishing the transformation of gas into liquid and back again was briefly explained by




**Fig. 3. Location plan of the proposed liquefaction plant, Lockport township, Ill.**

# One man repairs broken main!



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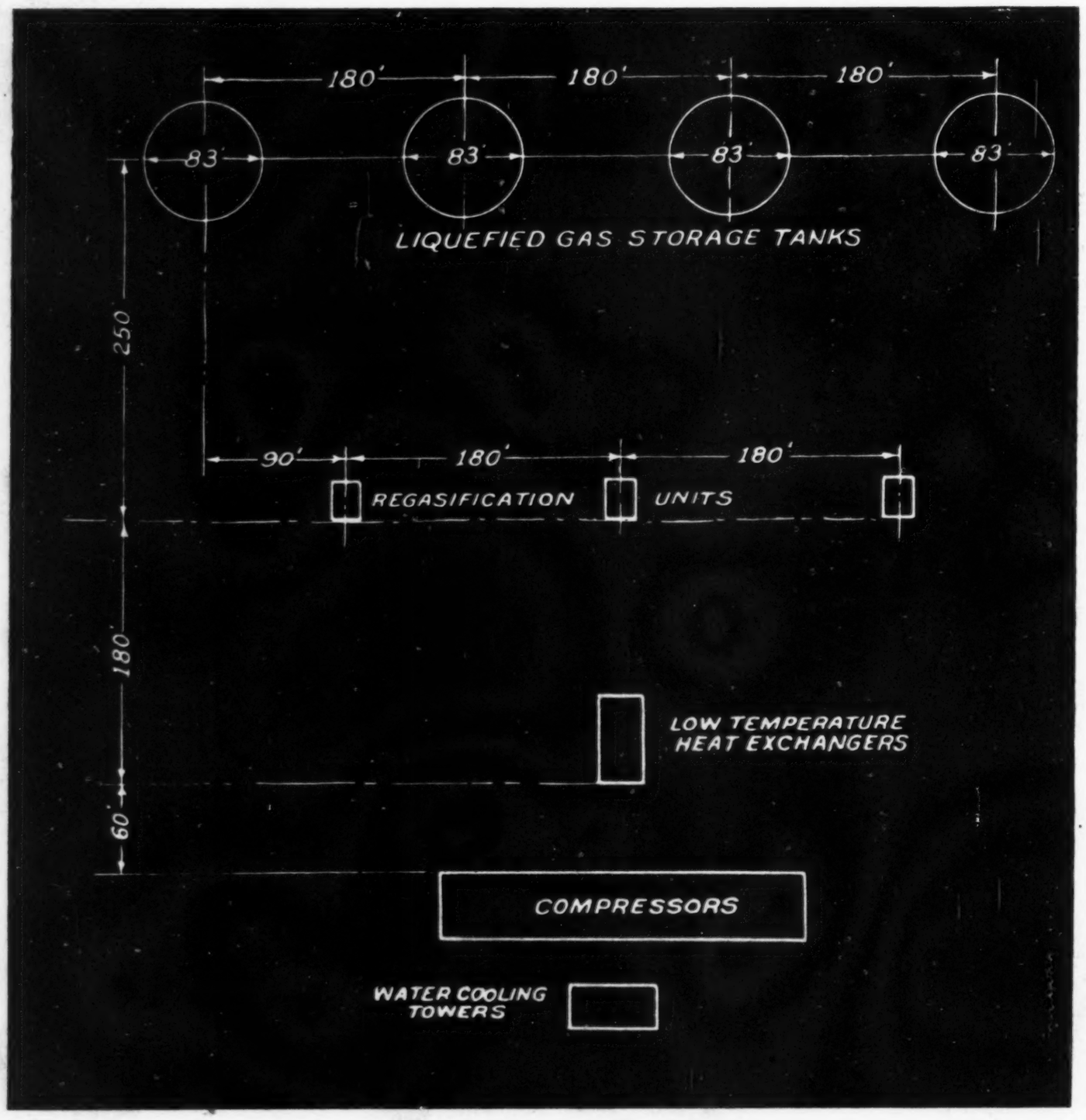
2" TO 16" INCL.

## TABLE 1. ESTIMATED INVESTMENT COST OF PLANT

**(193 Mcf/hr Natural Gas Liquefaction, 6000 Mcf/hr Regasification and 400,000 Mcf Capacity Liquid Storage)**

| | | |
|---|---|---|
| 1. | Land—666 acres | $ 300,000 |
| 2. | Fence around entire property—10,000 ft | 31,000 |
| 3. | Natural gas pipeline to plant—¾ mile | 52,000 |
| 4. | 21 engine compressors, 4100 hp auxiliaries, piping, insulation, heat exchangers, etc. | 697,000 |
| 5. | Compressor building, 243,000 cu ft volume, foundations, insulation, heating, lighting, etc. | 102,000 |
| 6. | Office, laboratory and men's service room building, 73,000 cu ft volume, equipped | 100,000 |
| 7. | Repair shop and storeroom, 75,000 cu ft volume, equipped | 70,000 |
| 8. | Boilers for heating and process, two 250-hp heaters, pumps, softener, piping, 450 kw electric generators, building, etc. | 184,000 |
| 9. | 10,000-sq ft evaporators and heat exchangers, drums, storage tanks, insulation, etc. | 415,000 |
| 10. | Cold box buildings, 30 x 65 x 30-ft eave x 36-ft ridge, 64,350 cu ft each | 70,000 |
| 11. | Two 12-in. wells, 750 ft deep, 600 gpm pumps and motors, wiring, and 20 x 20-ft building | 34,000 |
| 12. | Yard and miscellaneous piping | 18,000 |
| 13. | Propane, butane, $CO_2$ removal, gas drying, etc. | 225,000 |
| 14. | Regasification equipment—6 units, 3 buildings | 265,000 |
| 15. | Cooling tower, induced draft, 60-hp pumps, buildings, etc. | 110,000 |
| 16. | Roads, sewers, septic tank system, and yard improvement | 53,000 |
| 17. | Instruments and controls | 74,000 |
| 18. | Liquid storage—6 shells with 19 tanks each | 2,890,000 |
| 19. | Contractors profit and miscellaneous | 310,000 |
| | TOTAL | $6,000,000 |

**Fig. 4. The spacing of the major units to be installed for operation of the Chicago District Pipeline liquefaction and regasification plant.**




E. L. Hall, AGA Laboratories director, in a paper* presented before the Pacific Coast Gas Assn. last month.

Equipment to be used in the process includes gas engine driven compressors for compressing natural gas received from the transmission system and propane, ethylene, methane and nitrogen as refrigerants, totaling approximately 5500 hp, together with gas cleaning and conditioning equipment, heat exchangers, water circulating pumps and water cooling equipment, miscellaneous auxiliary equipment, control equipment, piping, valves, tanks, etc., and suitable buildings for housing the equipment.

Storage equipment will consist of six suitably insulated storage holders, each of approximately 67 MMcf capacity for natural gas in liquid form, with inner containers of a copper-nickel alloy and with outer shells of steel plate, together with necessary foundations, piping, valves, etc.

Regasification equipment will consist of suitable pumps, heat exchangers, and equipment for heating water to provide heat for regasifying the liquid natural gas and returning the gas at suitable pressure to the transmission system.

Background for construction and future operation of the setup was gained through pilot plant studies carried on by Chicago District since 1934 as well as tests and experiments conducted as early as 1929. This knowledge carried weight, particularly because of safety considerations, with the FPC, which stated in its order granting the certificate:

> Applicant has studied the problem . . . since approximately 1929 . . . In addition, studies have been made of other known pilot plants and commercial operations involving the liquefaction and storage of natural gas. These studies appear to establish the engineering feasibility and technical soundness of the proposed method of liquefaction and storage of natural gas.
>
> Applicant is cognizant that there are extraordinary hazards to be considered in connection with the construction and operation of such a plant, particularly (1) the behavior of commonly used construction materials at low temperatures, and (2) the nature of the liquefied gas and the cold vapor it gives off upon boiling. Applicant has assumed full responsibility for the design, construction and operation of the proposed plant and it recognizes that no factors, such as the recommendations and suggestions of outside consultants, or the issuance of a certificate in this proceeding, will relieve applicant of any part of that responsibility.

An interesting observation made by the commission had to do with specific hazards. The most serious hazard, according to FPC, arises from the circumstance that an enormous volume of liquefied gas is required to be stored for long periods of time. Furthermore, the danger is not from explosion, but

*Hall, Edwin L. "Eastern Plans and Practices."

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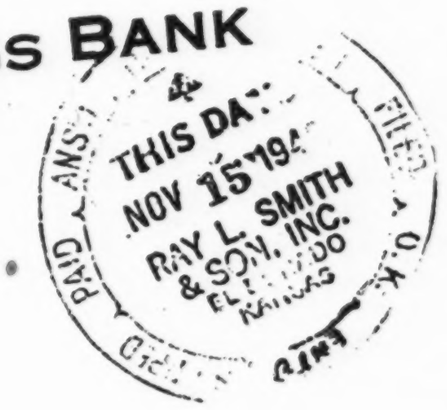
November,13,1948

W. N. GRANT, VICE PRESIDENT




Ray L.Smith & Son, Inc,.
El Darado, Kansas

Dear Mr.Smith,

Enclosed please find your statement with cancelled checks, I trust that you will find this okeh and in order.

We did enjoy having your account at this point during your operations in this and adjoining counties, also your consideration of a decent workable balance at all times, Your officers and employees were very nice to deal with and were very considerate of our efforts to serve them well, With all of this handling of funds and in most part all strangers we did not experience and difficulty and the loss was nil, none at all.

Thanking you and trust that if you have reason to come this way again we will be pleased to serve you.

With all kind regards, I am

Respectfully

W. N. Grant
Vice President

*An unsolicited letter from a country bank*

# RAY L. SMITH & SON, INC.

*Pipe Line Contractors*

Hazlett Building — El Dorado, Kansas

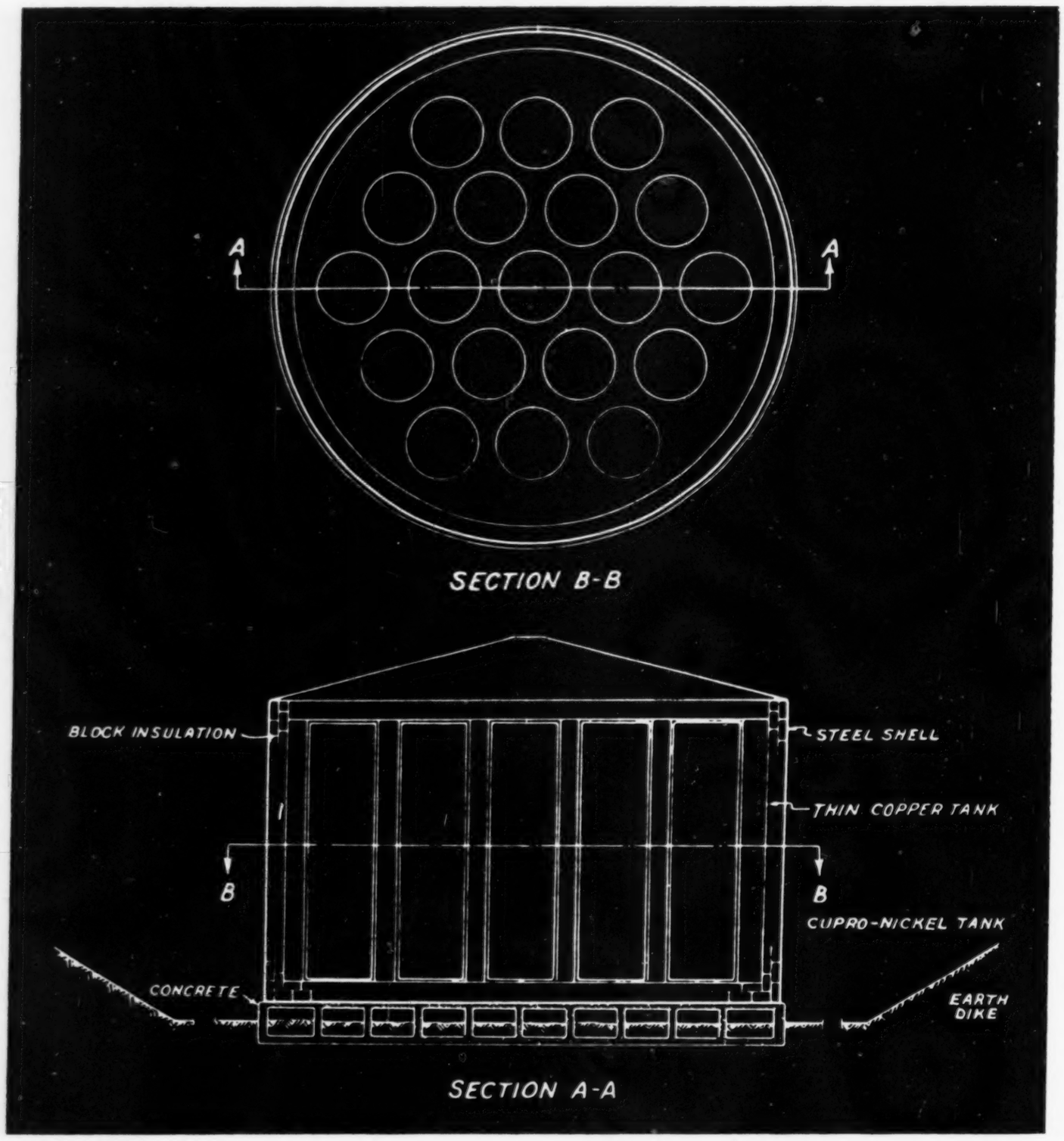



**Fig. 5. The storage tank for liquefied gas at the proposed plant. Note dikes of earth.**

The distance of "one-fourth mile" is particularly pertinent. Chicago District's plans allowed for this margin, plus an additional ample safety distance factor. A site *(Fig. 3)* was chosen consisting of 586 acres in Will county, Ill., about 8 miles north of Joliet. Composed of farm land located in a remote area, it has been rezoned, at the company's urging, from a farming classification to an industrial one to permit installation of the plant. The nearest inhabited dwelling outside the site will be only very slightly less than a half mile from the nearest tank. The nearest high tension overhead lines and railroad tracks are 2½ miles away. Little traffic passes along the adjacent roads.

The construction plan for the tanks *(Fig. 4)* was one of the most carefully scrutinized points in the entire project, because of its direct relationship to safety. The FPC delved deeply into this subject, and reports as follows:

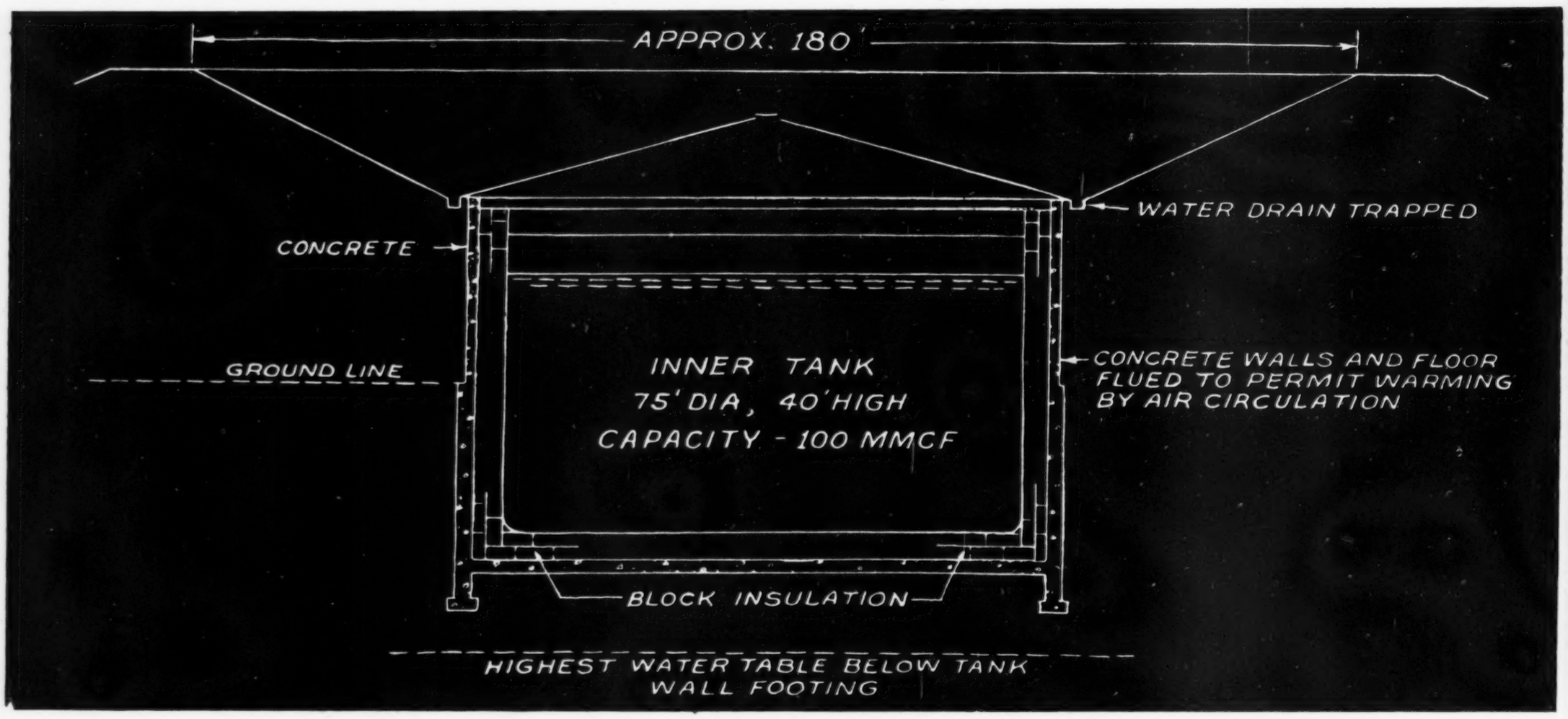
> Additional data submitted at the hearing in reference to storage tank construction showed applicant proposes to install a thin copper tank within the outershells of steel plate and insulation, and within which copper tank would be constructed the inner containers of copper nickel alloy . . . Applicant also submitted, as a possible alternative design, a double corrugated copper inner tank surrounded by block insulation which in turn would be surrounded by lead, wood and concrete walls. Surrounding the storage tank of either type would be constructed earthen diking designed to contain a volume equal to one and one-half times the volumetric capacity of the storage tank. (See *Figs. 5, 6, 7, 8.*)

Factors considered by applicant to be important in choosing material for the liquefied gas storage tank construction were

from fires:

> To bring about a condition which might result in an explosion would require a premixture of gas or solids having the necessary oxygen to support combustion; and the evidence shows that to bring about this condition in the particular type of equipment proposed by applicant would be very difficult to achieve by mixing of liquefied gas and air. However, the escape of the liquid in substantial volumes would permit a combination with oxygen which would produce an inflammable material. But the evidence further indicates that such inflammable material is not likely to flow, even if the failure were on a large scale, a greater distance than approximately one-fourth mile from the tank from which it might have been released.

**Fig. 6. Alternate plan for liquefied gas storage tank. Tank shown in Fig. 5 is company's first choice.**



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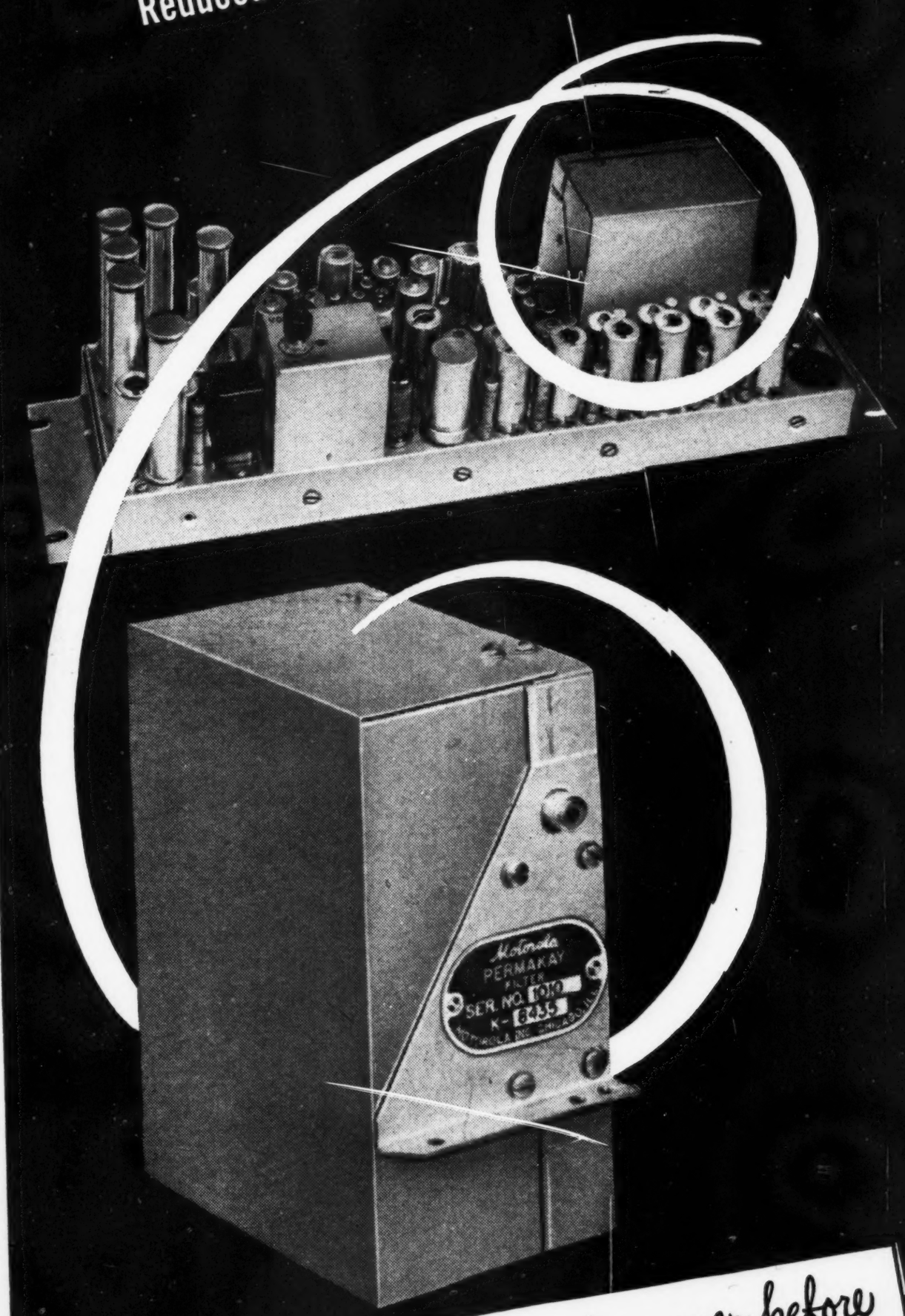


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(1) ductility, (2) strength, and (3) joinability.

Metallurgical experience and studies indicate that some metals, such as steel and certain alloys thereof, become extremely brittle at low temperatures, whereas there are other metals which are particularly adaptable for use at the extreme low temperatures contemplated in applicant's proposed design, namely, single phase metals having face centered cubic lattice crystal structure. Metals of this kind include copper and cupro-nickel alloy, both of which have a high degree of ductility at low temperatures, have increased strength at low temperatures, and are subject to the successful application of well established and widely employed methods for joining metals.

Copper has been used for a considerable time in storage tanks employed at the liquefied helium plants operated by the United States government, and also in various pilot plant operations in which natural gas and other gases are liquefied and stored. The record does not reflect any actual experience in the use of cupro-nickel at low temperatures or for purposes such as that proposed by the applicant.

However, a representative of a nationally known, responsible, and reliable commercial fabricator of metals testified that cupro-nickel is suitable and satisfactory for the storage of liquefied natural gas, and recommended its use for that purpose. Both of the alternative designs for storage tank construction proposed by applicant contemplate the utilization of either copper or cupro-nickel for that portion of the tanks which would come into physical contact with the stored liquid.

Applicant recognizes that no tank design or construction can be expected to eliminate entirely the possibility of holder failure but provision can be made to reduce further the possibility of such eventuality. Among such provisions are earth-diking and plant isolation. Thus, the proposed site would include extensive ground areas beyond those actually occupied by the plant which would be utilized solely for the enhancement of safety.

The testimony presented by the applicant is to the effect that the construction and operation of the proposed liquefaction and storage plant in the design and manner proposed by applicant embrace the application of the best knowledge and experience presently available in the field; that such construction and operation are suitable, safe and feasible for the purposes proposed; and that the selection of materials, the design of facilities, and the isolation of the proposed plant, are calculated to provide safety in any eventuality reasonably to be expected to occur.

The commission wound up its consideration of the proposal with this clincher:

Applicant has specifically considered each finding and recommendation made by the official committees appointed for the study and investigation of causes of the failure in one of the liquefied natural gas storage tanks at the Cleveland plant of East Ohio Gas Co., and presented evidence that the proposed plant meets the applicable requirements of those recommendations. In addition, an official of the U. S. Bureau of Mines testified that the design of natural gas liquefaction, and storage facilities and location of the plant proposed by applicant conform to the intention of the recommendations of the U. S. Bureau of Mines Report on the Investigation of the Fire at the Liquefaction, Storage, and Regasification Plant of The East Ohio Gas Co.

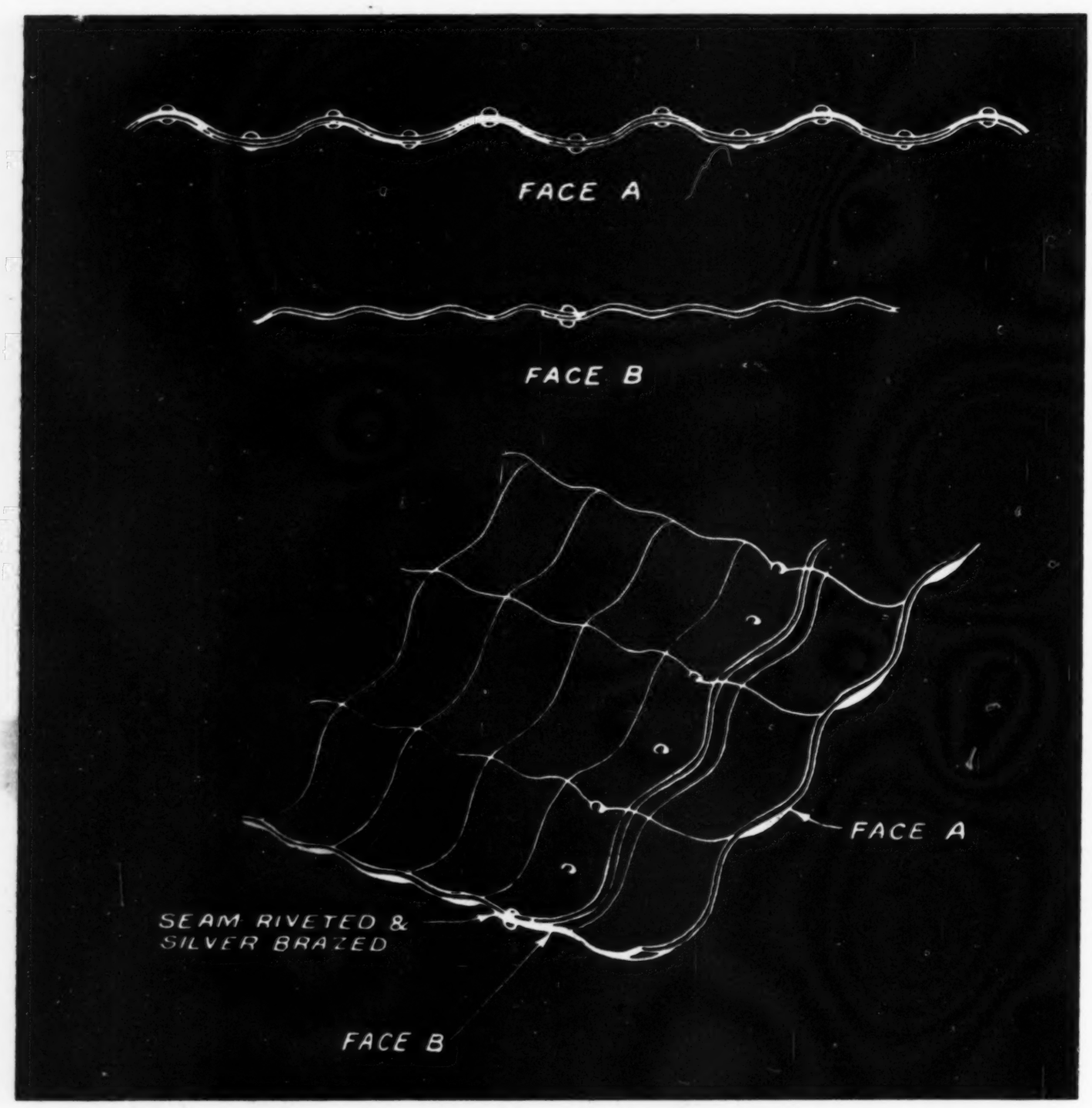
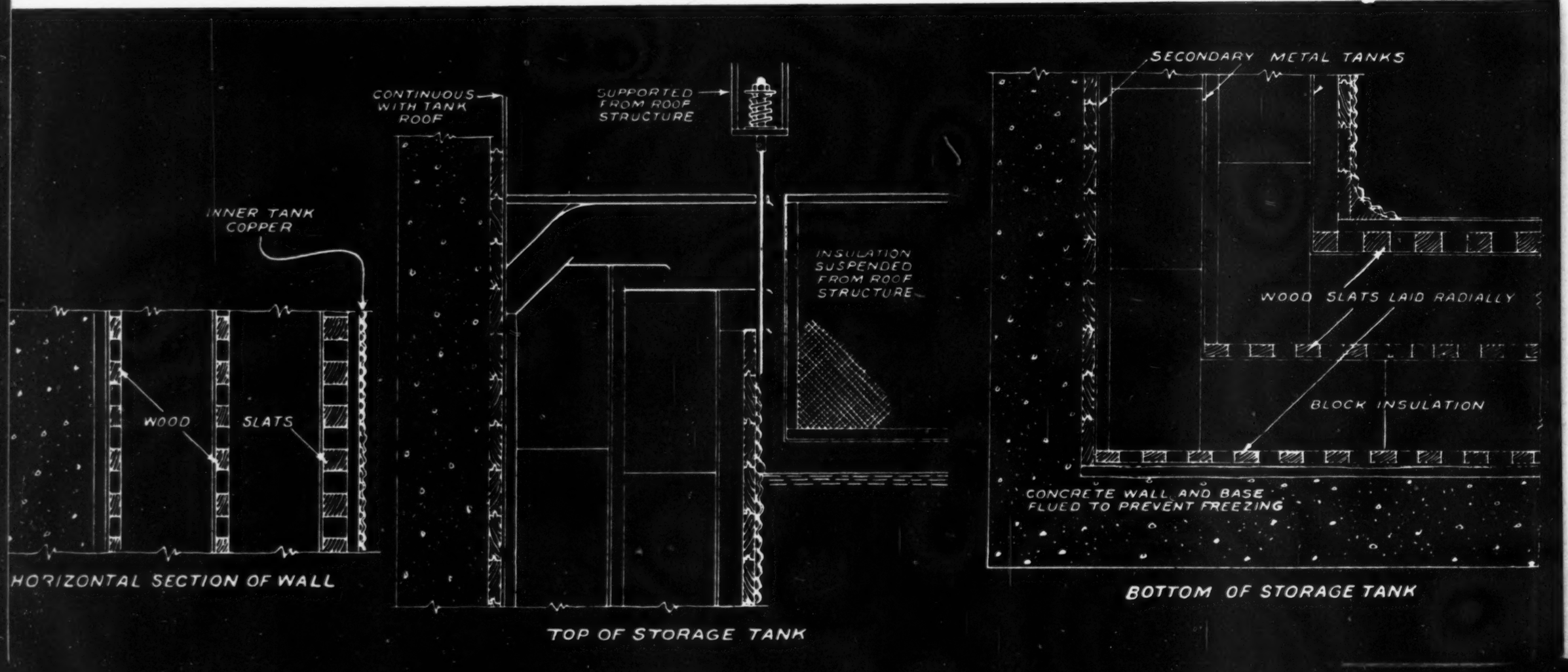
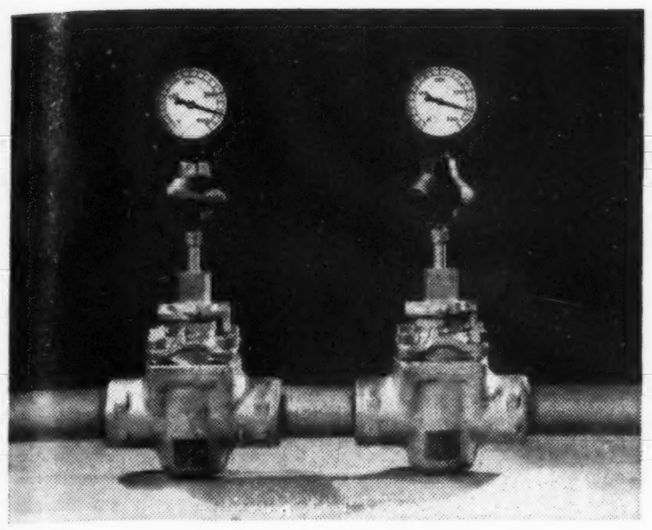
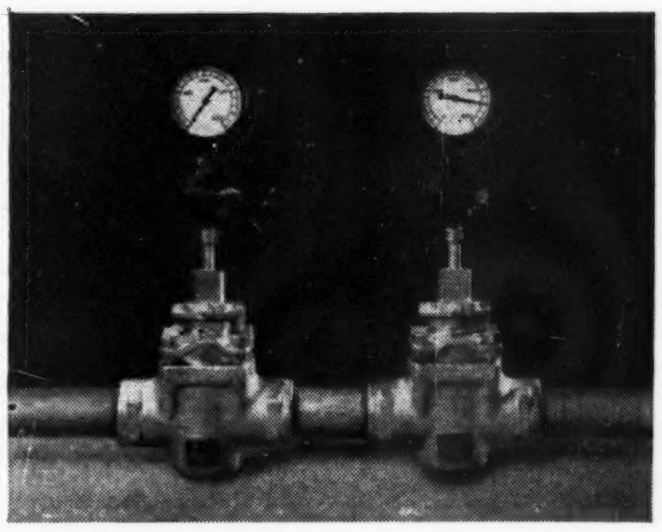



**Fig. 7. Inner tank wall sheeting proposed for alternate tank design, as shown in Fig. 6.**

**Fig. 8. Vertical section on the diameter of alternate storage tank design. Note strength measures taken to insure safety of the tank during liquefaction process.**







**Comparative tests show pressure retention. In photo at left, left hand valve was pressurized at 350 psi with non-energized lubricant. Automatic energized lubricant was used in right hand valve. Photo at right, taken six months later, shows pressure drop to 0 psi on non-energized lubricant, negligible on energized lubricant at right.**

# "Energizable" Valve Lubricant Announced

A "phenomenal" energizable plug valve lubricant which provides fully automatic action in maintaining continuous lubrication to insure instant sealing of leaks has just been announced by Nordstrom Valve Division of the Rockwell Manufacturing Co.

No lubricant heretofore known has the characteristics for storing within itself energy to be used in distributing its lubricating qualities throughout a valve system over a prolonged period. This new compressible lubricant, christened "Hypermatic," allows *automatic* lubrication to be established in valves of the Nordstrom type.

## Cost Cut Predicted

Lubrication costs of pressurized valves may be cut from 20% to as much as 90%, and valves will be maintained at a higher peak of efficiency when Hypermatic is used, according to George F. Scherer, Nordstrom's director of research. Lubrication frequency, it is asserted, may be cut to as little as 1/100 of the present standard because, according to the manufacturer's claim, this lubricant defies physical laws by being actually compresssible, maintaining an "energized" condition which automatically feeds the lubricant to seal setting surfaces and to fill voids in event of a leak.

Retaining the energy as it does for an almost limitless number of valve turings, and being capable of being re-energized when the pressure finally subsides, simply through refilling of the valve chambers or by a turn of the lubricating screw to recreate stored energy, it eliminates the single objection to lubricted valves—the necessity of frequent relubrication.

Field tests thus far have proved its success, says Nordstrom, under most conditions in a temperature range of 250°F. Applications to lines of higher temperature and to other fields await the outcome of further tests.

Nordstrom compares Hypermatic's performance in a closed reservoir to the action of a tank of compressed air which has stored within itself sufficient energy to permit intermittent or continuous work to be done as air is bled off into mechanical devices. Similarly, Hypermatic performs work of renewing within itself the lubricant sealing surfaces.

While standard lubricants maintain pressure within the valve only a short time, Hypermatic, the manufacturer claims, continues to exert pressure to flll lubrication voids until the confined pressure drops to a minimum of 50 lb. The time during which the valve maintains 100% automatic lubrication without repressurization depends upon the number of valve closures and the amount of lubricant stored within the valve. Fully automatic lubrication may be stored simply by adding more Hypermatic in stick form or with grease gun.

Long neglect of a valve, which would dissipate the energy of the lubricant, would merely cause it to revert to the status of a non-automatic lubricant.

Three advantages are claimed: (1) Decrease in the frequency of valve lubrication; (2) maintenance of valves in a state of 100% lubrication, and (3) maintenance in operable condition without first stopping to relubricate the valve. Additional advantages are that Hypermatic achieves automatic lubrication without any expensive mechanical contrivances, that it maintains a better pressure equilibrium and thus lowers lubricant consumption, and that it extends valve life expectancy.

Its lubricating properties and wetting action are similar to those of standard lubricants. It is available in stick or bulk.

Non-compressible lubricants could duplicate to some extent its performance if pressure were maintained on the lubricant while the valve was being turned. Hypermatic, however, automatically maintains this pressure over a great number of valve closures. Although continually under pressure, it will not feed into the line, nor is it necessary that it be under pressure as high or higher than the line pressure, because while it flows easily through its valve channels, it resists replacement.

If lubricant pressure falls far below line pressure, Hypermatic still continues to replenish sealing surfaces. For example, if a line fluid leak inside the valve were to develop, a pressure gradient along the path of leakage would exist, with downstream exit pressure being substantially below upstream pressure. In such a case the lubricant pressure required to inject the lubricant into the path of the leakage would be approximately equal to the static pressure of the leakage stream at any point.

## Lubricant Pressure

Downstream, when the pressure is zero, lubricant pressure required to seal off the leak at this point would have to be only slightly higher than zero. Thus, Hypermatic stops leaks automatically.

This lubricant may be used in all Nordstrom type valves with only normal adjustments needed to hold it. Purging of standard lubricants before inserting it is unnecessary. The old lubricant is gradually forced out over a period of time.

A descriptive bulletin may be obtained from the Nordstrom Division, Rockwell Manufacturing Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.

**G. F. Scherer, "Hypermatic" developer.**

# "A Cubic Foot of Gas"

By WARREN J. COLLINS

**Ramifications of the Texas law which standardizes gas measurement methods**

THE 51st legislature of the state of Texas which adjourned on July 6, enacted House Bill 159, known as the "Standard Gas Measurement Law." As finally enacted the bill differed materially from the bill originally proposed and introduced. As originally introduced House Bill 159 was a disguised price-fixing measure. In an adroit manner it purported to raise the price paid for gas under existing contracts by changing the standard of measurement for gas purchased and sold under such contracts. It purported to require that all deliveries of gas under existing contracts be measured on the basis provided by the act, that is, a pressure base of 14.65 psia and a standard temperature base of 60°F.

Since most existing contracts provided for the measuring of gas on the basis of 2 psi above 14.4 psia and at a temperature base of 60°F, the effect of the bill was to decrease the deliveries of gas by approximately 12% without any corresponding adjustment in the price. This particular feature of the bill met with strenuous opposition and was eliminated. As finally enacted the bill does not affect the total amount of money paid for a volume of gas purchased or accounted for under an existing contract.

### Definition

A "cubic foot of gas" or "standard cubic foot of gas" is defined as follows:

> Section 2. The term "cubic foot of gas" or "standard cubic foot of gas" means the volume of gas contained in one cubic foot of space at a standard pressure base and at a standard temperature base. The standard pressure base shall be 14.65 psia and the standard temperature base shall be 60°F. Whenever the conditions of pressure and temperature differ from the above standard, conversion of the volume from these conditions to the standard conditions shall be made in accordance with the Ideal Gas Laws, corrected for deviation.

In order to conform and calculate the metered volumes of gas in accordance with the "cubic foot of gas" as defined, the Railroad Commission of Texas was authorized, empowered and directed to "determine the average temperature of gas, as produced in each oil and gas field in Texas, and to determine the other variable factors necessary to calculate the metered volumes in accordance with the Ideal Gas Laws and the variable factors to correct for deviation from the Ideal Gas Laws in each of the oil and gas fields in the state of Texas." The findings of the railroad commission are required to be published, and the commission is authorized to promulgate field rules necessary to effectuate the provisions of the act.

### Authorization

Any person, firm, association of persons or corporation is authorized to use the findings of the commission but not required to do so. If the commission's

Mr. Collins is with the legal department of Lone Star Gas Co., Dallas.

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To overcome this limiting factor, Fluor Engineers have developed the Fluor Series "D" Muffler System—a scientifically designed muffler *system* wherein work is started on exhaust gases in the immediate proximity of the engine—a muffler *system* that provides all of the advantages of the Fluor Model "T" Muffler *plus* added design features that solve field muffling problems conventional mufflers do not even attempt to solve—and at a cost competitive with conventional single-element mufflers.

### *A scientific approach to better muffling*

The Fluor Series "D" Muffler System incorporates the principle of an acoustical filter consisting of *three* separate, component parts—a primary chamber (A), interconnecting piping (B), and a secondary chamber (C). Element "A" which is located in the immediate proximity of the engine exhaust manifold starts removal of exhaust noise and pulsation at their source. Element "B" is the interconnecting piping which further removes noise and pulsation. Element "C" of the muffling system is located outside the engine room and contains engineered internals that remove the remainder of exhaust noise and pulsation.

### *Simple installation*

In addition to providing the highest muffling efficiency obtainable, the Fluor Series "D" Muffler System needs no redesign or alteration of existing plans for installation in new or old plants. It takes no more space than conventional mufflers—in 95% of cases space requirements are *less* than conventional type mufflers—in 5%, the same as conventional type mufflers.

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findings are not used, then the volumes of gas as otherwise determined are to be corrected to the basis of a standard cubic foot of gas as defined above.

### Official Use

By Section 3 of the act the "standard cubic foot of gas" as defined is required to be used for all the purposes of Article 6008, 1925 R.C.S. of Texas, as amended, which is the gas conservation statute. In other words, when gas is involved all reports and other matters before the Railroad Commission of Texas must use the "standard cubic foot of gas" as defined.

By Section 4 of the act, subdivision 12 of Section 2 of Article 7047b, Vernon's Civil Statutes of Texas, is amended so as to require the use of the "standard cubic foot" of gas as defined. This article imposes the gas production tax. Therefore, for the purposes of Article 7047b the "standard cubic foot of gas" as defined must be used, but this requirement will not operate to increase the gas production tax presently paid by producers.

By Section 5 it is provided that "each and every sale, and each and every purchase, delivery and receipt of gas by volume hereafter made in this state, by, for or on behalf of an oil and gas lease owner, royalty owner thereunder, or other mineral interest owner, shall be made and such gas shall be measured, calculated, purchased, delivered and accounted for on the basis of 'a standard cubic foot of gas' as defined in Section 2, and as determined under this act." But, by express provision of this section it is not to change existing contracts. The specific language covering this phase of the bill reads:

> Whenever the provisions of this act operate to change the basis of measurement provided for in existing contracts, then the price for gas, including royalty gas, provided for in such contracts shall, if either the purchaser or seller so desires, be adjusted to compensate for the change in the method of measuring the volume of gas delivered thereunder. This provision is intended to protect parties to contracts now in existence, so that after this act becomes effective the total amount of money paid for a volume of gas purchased, or required to be accounted for, under existing contracts shall remain unaffected by this act.

### Contract Application

The bill, however, clearly applies to future contracts and agreements made for or on behalf of an oil and gas lease owner, royalty owner or mineral interest owner. That is, such contracts must determine the volume of gas in accordance with the "standard cubic foot of gas" as defined in the bill.

Although such contracts as have been mentioned must incorporate the "standard cubic foot of gas," there is nothing in any part of the act which purports to regulate the price that may be paid for gas. Producers and operators are left free to use any price which can be agreed upon. They are only required to use the "standard cubic foot of gas" to determine the volumes of gas purchased, sold, delivered and accounted for.

### Effective This Month

Although the act provides that it shall be effective 90 days after its passage, its legally effective date is 90 days after the adjournment of the legislature. Therefore, it becomes a law Oct. 5, 1949.

Since the legislature saw fit to enact House Bill 159, it is hoped that the standardization of a cubic foot of gas will forever do away with certain criticisms and complaints made by some producers and royalty owners in the state and may it prove to be as beneficial to the industry as a whole as has been represented.


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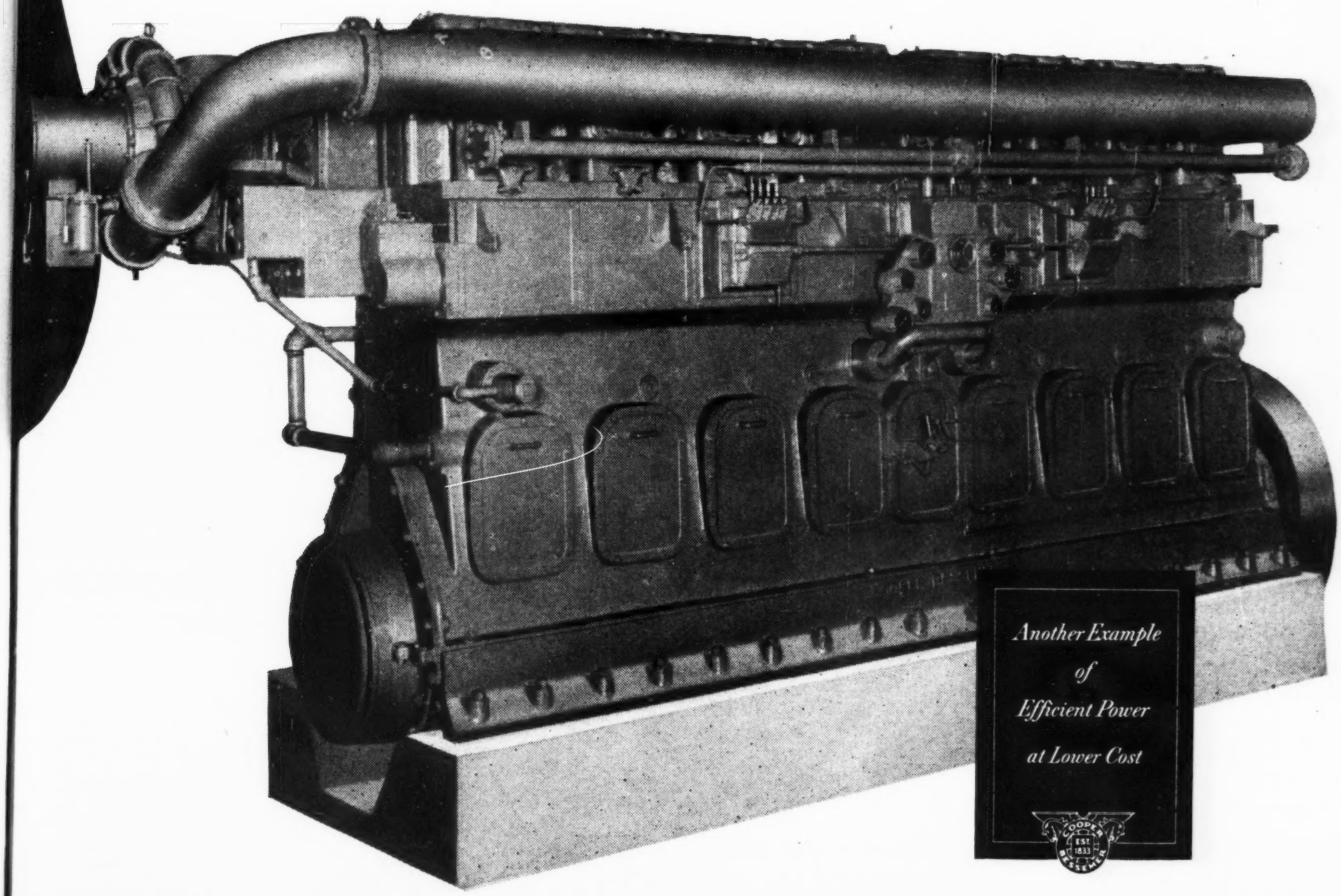

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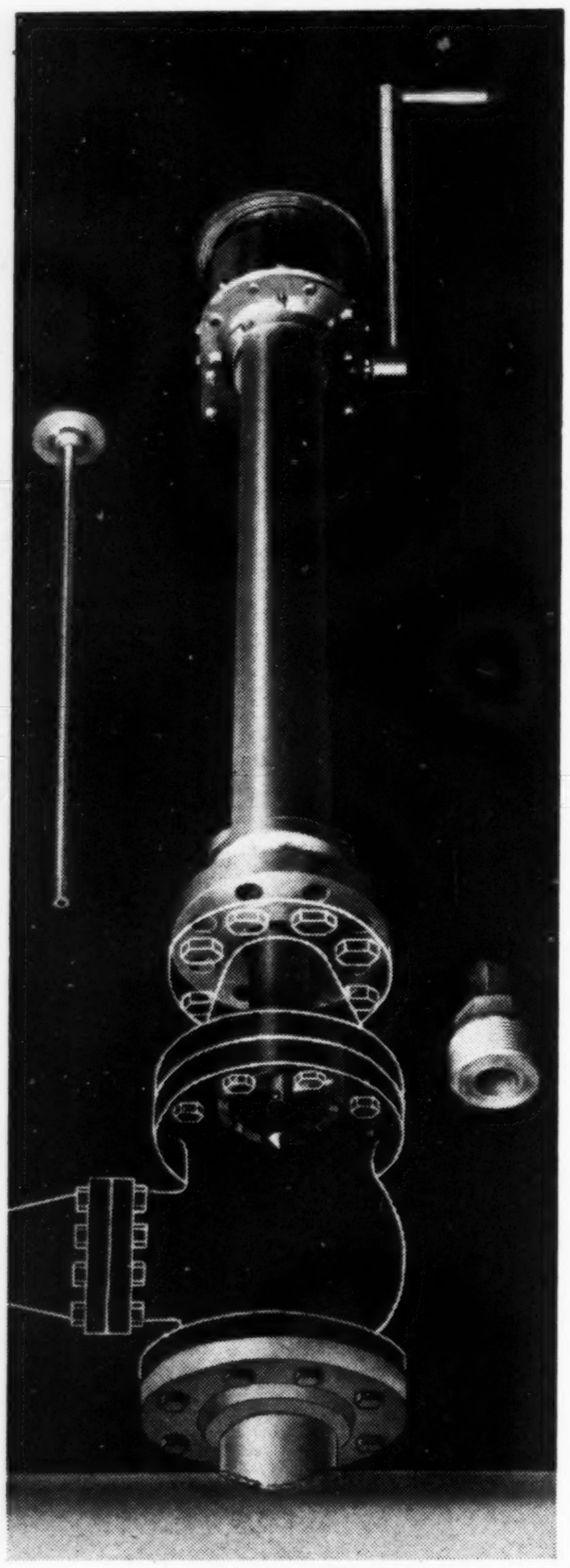

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# INVASION PLANS FOR SOUTHEAST AIRED

## Consolidated hearings under way to decide which line will serve gas-hungry seaboard

Lines were drawn Sept. 20 for a free-for-all, last ditch battle over whether the long-neglected Southeast is to have natural gas within the foreseeable future. Hearings were set to get under way that date in Tallahassee, Fla., for a final showdown, with the three companies concerned—United Gas Pipe Line Co., Atlantic Gulf Gas Co., and Southern Natural Gas Co., the well-organized Southeastern Assn. of Municipalities for Natural Gas, and the coal and railroad intervenors all scheduled to get in their best punches.

This hearing was the first one at which the proceedings of all three participating companies would be heard. After consolidating the Southern Natural and Atlantic Gulf proceedings, for which hearings were commenced in Washington in August, the commission recessed Sept. 2, added United's case to the agenda, and scheduled the new hearings.

United Gas Pipe Line and Atlantic Gulf are subsidiaries of United Gas Corp. United proposes to build 224 miles of line from fields in southeastern Louisiana to deliver gas to the western terminus of Atlantic Gulf's proposed Louisiana - Florida - South Carolina project.

United's proposed project, to be built at an estimated cost of $25,060,000, would deliver the requirements of the proposed Atlantic Gulf line, estimated at 384,251,000 cu ft per day for the fifth year of operation.

Atlantic recently filed an amended application in connection with its proposed line. The Atlantic project, as now proposed, involves 1731 miles of pipeline extending from eastern Louisiana across Mississippi, Alabama and into Georgia, where it would fork out with one line extending northeasterly to Georgetown, S. C., and the other southeasterly to Jacksonville, Fla. Estimated cost of this construction is $92 million.

**Map shows location of the Arkansas Louisiana Gas Co.'s proposed pipeline which will deliver natural gas from east Texas to central Arkansas. This new addition to the present 2200 - mile pipeline system will benefit all of the 118 communities now served and will make possible the addition of more domestic, commercial and industrial customers.**

# PENNSYLVANIA-OHIO LINE SOUGHT

Grand River Gas Transmission Co. has filed application with FPC for authorization to build 74 miles of natural gas pipeline in western Pennsylvania and northeastern Ohio. The company plans to purchase gas from Tennessee Gas Transmission at a point near Meadville, Pa., for transportation either for hire or for resale to delivery points in Lake and Ashtabula counties, Ohio.

Grand River's project would consist of 42

**Crews unload pipe from barge as East Tennessee Natural Gas Co.'s 172-mile line, which will take gas to Oak Ridge for the Atomic Energy Commission, finally gets under way.**

Photo courtesy of
Oklahoma Contracting Co., Inc.

# Looks good from in here!

For good pipe, write, wire, or phone Master Tank and Welding. Full production is underway on 10″, 20″ and 30″ line pipe in sections 31′ 6″ long, and larger diameter pipe in 18-foot double-jointed sections for 36-foot requirements.

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miles of line between Meadville and Austinburg, Ohio, from which point a 10-mile line would extend to Ashtabula and a 22-mile line to Fairport, Ohio.

The company stated it would transport the gas for hire or for resale to the Lake County Gas Co., the City of Painesville Gas Dept. of Public Service and the Lake Shore Gas Co.

Cost of the project is estimated at $1.9 million.

## EASTERN NATURAL FORMED TO BUILD VIRGINIA LINE

Eastern Natural Gas Co. (Richmond, Va.) has petitioned FPC for authorization to build a 165-mile natural gas pipeline from Stanardsville, Va., southeasterly to Norfolk. The project would cost an estimated $5.94 million.

The company is also proposing to build lateral lines extending from the main line to market areas along the route. The company was organized for the construction of this line.

Under the application, Eastern proposes to supply the entire natural gas needs of the cities of Charlottesville and Richmond, through the municipally owned systems in the two cities. Other utility systems that Eastern proposes to serve are Petersburg & Hopewell Gas Co., Suffolk Gas Co., Portsmouth Gas Co., and Virginia Electric & Power Co.

In addition, the following industrial customers would be serviced: E. I. DuPont de Nemours & Co. Inc. (Ampthill), generating plants of Virginia Electric & Power Co. (Richmond and Norfolk), and Solvay Process division of Allied Chemical & Dye Corp, Hercules Powder Co., and Continental Can Co., all at Hopewell.

The company proposes to get gas from the lines of Virginia Gas Transmission Corp. and Transcontinental Gas Pipe Line Corp.

## PEACE RIVER INTENSIFIES EXPLORATION IN NEW PROPERTY

An intensified search for gas and oil is now being carried out in a 900,000-acre area in British Columbia by Peace River Natural Gas Co. Following issuance of a permit by the provincial government, a new well known as Peace River Test No. 8 has been sunk.

In six of ten wells that have already been drilled in other properties, Peace River has struck gas in volumes ranging from 3 to 30 million ft a day. Another well in southern Alberta, a Gulf Oil Co. discovery in the Pincher Creek area, is reported to have a calculated potential of 80 MMcf per day.

Peace River Gas is affiliated with Pacific Petroleums which, in turn, is linked with Westcoast Transmission Co., the firm which is planning to pipe gas to Vancouver and south into the United States.

## LOUISIANA LOOP TO BOOST UNITED GAS DELIVERIES

FPC authorization has been requested by United Gas Pipe Line Co., of Shreveport, to build 105.6 miles of loop line in Louisiana in order that deliveries of natural gas to Mississippi River Fuel Corp. may be increased to 195 MMcf daily.

The proposed 20-in. loop line would parallel United's existing 24-in. line between Carthage, Texas, and Sterlington, La., for part of its length and would extend from De Soto county, near the Texas-Louisiana border, to a point in Ouachita county near the city of Monroe, La.

Cost of the project is estimated at $5.1 million.

## EL PASO BUYS NEW MEXICO LAND

C. C. Cragin, general manager of El Paso Natural Gas Co., reported recently that El Paso has purchased 1600 acres in northern Chaves county, New Mexico, from Apache Oil Co. The contract is contingent on completion of a well termed by many as one of the most important wildcat wells ever drilled in New Mexico.

Price for the land was not disclosed. The contract, which calls for completion of the above mentioned well to a depth of 9000 ft, involves about half of Apache Oil's property in the state.

## DAY NAMED DISTRIBUTOR

The S. D. Day Co., Houston, has been appointed as southwest representative for Pittsburgh Coke & Chemical Co.'s protective coatings. Stephen D. Day, head of the sales firm, established the business recently (see August *GAS*, p. 60). Mr. Day was formerly with the Barrett Co. and, more recently, was vice president in charge of southern sales for Pipe Line Service Corp.


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Tough Cuts MADE EASY

Accurate milled cut at 2" per minute.
Close quarters + explosion hazard, bagged-off 24" pipe, 14⅞" clearance.
Two clean square cuts and the pipe comes out.

CUTS 12" TO 48" CAST IRON OR STEEL PIPE UNDER THE MOST DIFFICULT CONDITIONS

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- Small excavation — only 14" clearance needed.
- One machine cuts all pipe sizes from 12" to 48".
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The Sioux City Gas and Electric Co. of Sioux City, Iowa made two cuts on a 24" cast iron main in less than two hours. The above illustrations show the close quarters and "bagged-off" main. A hand made cut under these conditions would have been slow, hazardous and costly. The WACHS NATIONAL PIPE SAW did the job fast, safely and at low cost.

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## HEARINGS OPEN IN YEAR-OLD PIEDMONT LINE CASE

Whether the Piedmont area of the Atlantic Seaboard will receive natural gas in the foreseeable future will be decided in Federal Power Commission hearings which opened Sept. 14 in Washington. On that date Piedmont Natural Gas Co.'s application for a permit to build a 1290-mile line from Texas to Virginia was scheduled for consideration.

Sources in the Southeast predicted that Coastal Pipe Line Co., Birmingham, Piedmont's sole competitor in the race to carry gas to the area, would withdraw its application.

Plans for the Piedmont line, which were announced in August 1948, called for building a $75 million project. Construction would start within 90 days of FPC approval, according to the original application. Last April 6 Piedmont filed an amended application seeking to extend the line, and a new cost estimate of $97 million was given.

Daily capacity is estimated at 275 MMcf.

## TEXAN DEMANDS EXPORTS HALT

The perennial question of when the increase in Texas gas exports will be stopped was broached again last month by Rep. W. R. Chambers of the Texas legislature. Mr. Chambers predicted that when the next session opens in January the battle over his resolution declaring a state policy against increasing the amount of export will be reopened.

The resolution was adopted by the house last spring, while the senate failed to act on it. Under his plan, the state railroad commission would be directed to oppose all future applications to the FPC for further export. He pointed out that most of the 2 billion cu ft of gas which will be utilized in projects approved by the FPC in the first six months of 1949 will be taken from Texas.

## CENTRAL NEW YORK WANTS LINE

Pipeline facilities designed to carry approximately 4.1 MMcf of natural gas per day into Oswego, Onondago, Madison, Oneida and Herkimer counties in New York state are proposed in a joint application filed by Central New York Power Corp. and New York Power & Light Corp. with the FPC.

The bulk of the $972,000 cost of the project would be expended by Central, which would construct a 16-mile line to receive the volumes specified in the application from its present supplier, New York State Natural Gas Corp. The gas would be used for distribution in Central's Utica division and New York Power's Oneida district, for resale to New York Power's Oneida district and for reforming and enriching in parts of Central's manufactured gas areas.

## MESABI WITHDRAWAL OKAYED

Permission has been granted by the FPC for Mesabi Pipe Line Co., of St. Paul, Minn., to withdraw an application filed last year, under which the company proposed to build a 400-mile natural gas pipeline from Keokuk county, Iowa, to Itasca county, Minn.

Mesabi originally planned to obtain its gas requirements from the northern terminus of a Louisiana-Iowa pipeline which Trunkline Gas Supply Co. at that time proposed to build. Subsequently, however, Trunkline submitted an alternate plan, involving a main pipeline from Texas to Nebraska. This latter route was selected by FPC when it authorized the Trunkline project.

## ALCOA LINE CONTRACTED

A new pipeline to take gas from wells in Matagorda Bay just east of the property of Southern Production Co. Inc., Shreveport, to an aluminum reduction plant at Point Comfort has been provided for in a contract recently signed by Southern Production and Alcoa Mining Co., builder of the plant.

The Aluminum Co. of America, owner of Alcoa Mining, already has a pipeline which is taking gas from wells in the area.

## NATURAL FOR NEW YORK AREAS

Central Hudson Gas & Eelectric Corp., of Poughkeepsie, N.Y., will build a 40-mile natural gas pipeline to carry gas to Duchess, Orange, and Ulster counties in New York, subject to FPC approval of the plan.

In submitting the proposal for commission decision, Central Hudson explained that the proposed line would connect with the new Home Gas Co. line at Tuxedo, N.Y., and extend northerly to Central Hudson's gas plant in Poughkeepsie. Estimated overall cost of the line would be $1.7 million.

The company said the use of gas by its customers is now severely limited by the high rates of manufactured gas.


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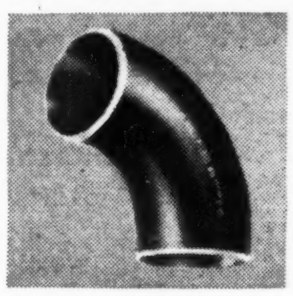
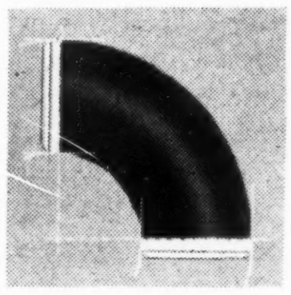
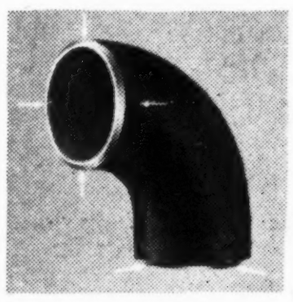


**Seamless** — no question about soundness in a seamless fitting.

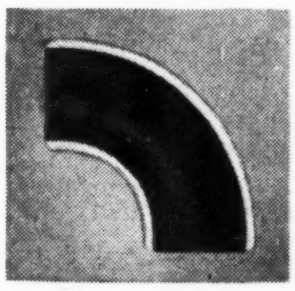


**Tangents**—simplify lining up; keep weld away from zone of higher stress.

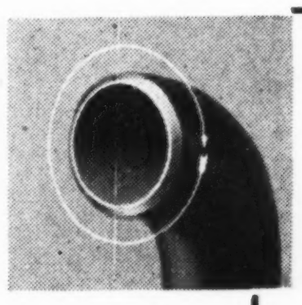


**Precision quarter-markings**—speed layout; insure accuracy.

**Clear identification** — saves time, stops mistakes.



**Full strength throughout**—wall thickness never less than specification minimum.



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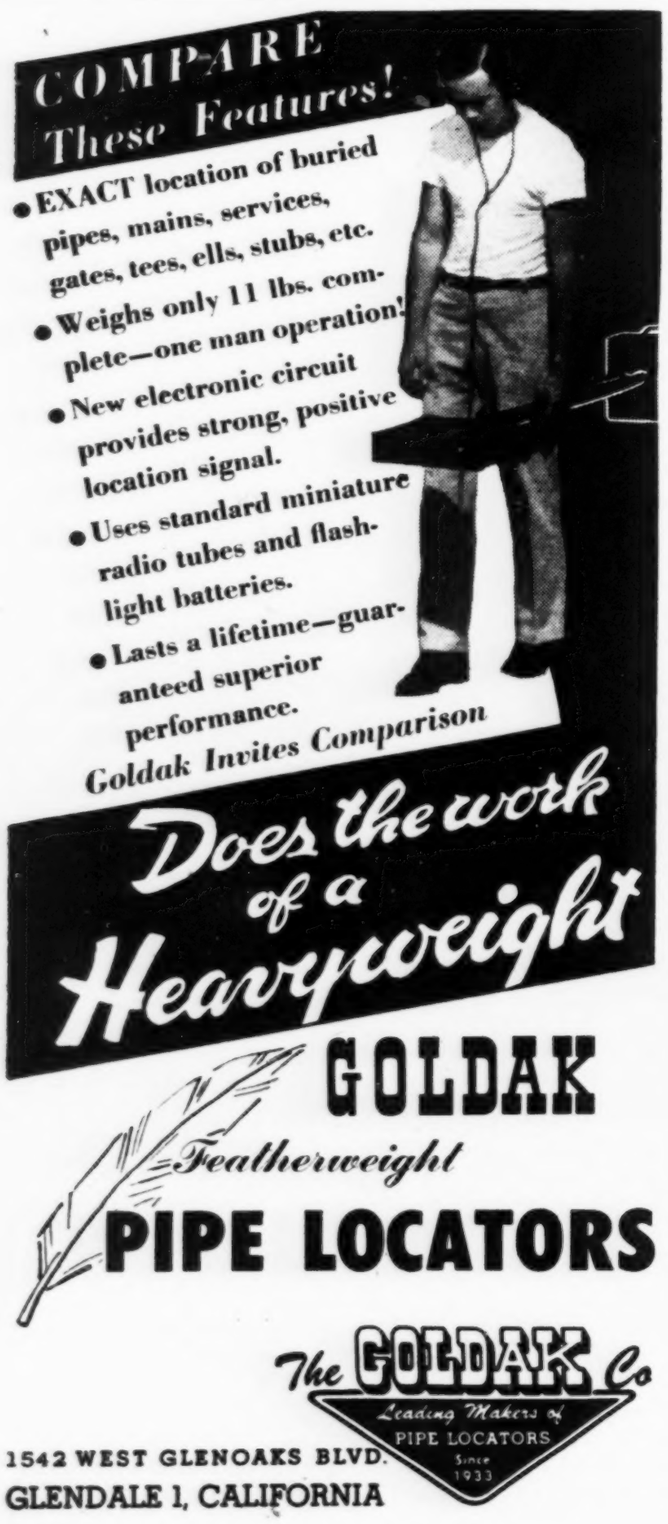
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## BREAK FOR ARKANSAS

### Gas from two lines will aid state's growth

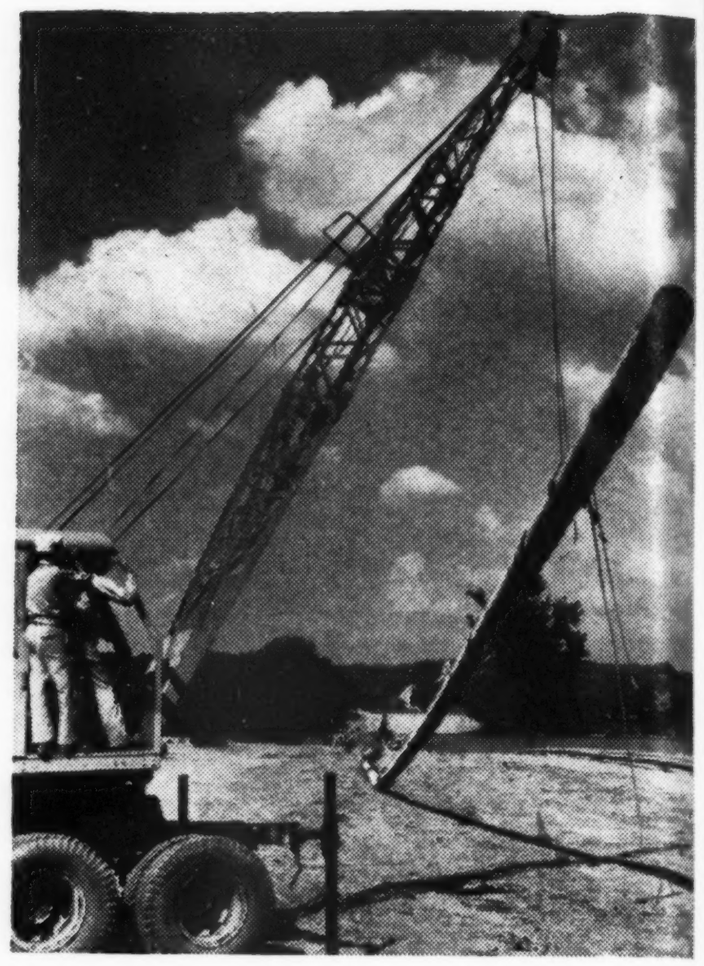
Activity under way last month in Arkansas promises to strengthen the natural gas fuel situation in several important areas throughout the state.

At latest reports, FPC hearings were still under way on an $8 million pipeline proposed by the Arkansas-Louisiana Gas Co. which would carry gas from the productive Waskom, Texas, field to the rapidly growing central Arkansas region. A 20-in. line, it would run 163 miles to a point near Malvern, Ark., from which point other lines already in service would carry the gas east to Pine Bluff, west to Hot Springs, and north to Little Rock.

A second development of importance to the state was the approval Sept. 9 by the Arkansas Public Service Commission of an application of the Fort Smith Gas Co. to build transmission and distribution facilities for the town of Pocahontas in Randolph county. The gas for this line will be purchased from the Mississippi River Fuel Corp.'s line from Monroe, La., to St. Louis, which runs about 5 miles east of Pocahontas.

New compressors which are being added to the line to increase capacity from 266 MMcf to 320 MMcf will make this tie-in possible. March 1950 has been set as the earliest probable date that the city will begin receiving gas.

The line which Arkansas-Louisiana Gas Co. plans to build would parallel the company's present system for about 90 miles between its plant at Magnolia, Ark., and the Perla reducing station near Malvern. Capacity of the line will exceed 200 MMcf. Contracts have already been let to Latex Construction Co. which will build the Magnolia-to-Malvern section, including a multiple crossing of the Little Missouri; Anderson Bros. Construction Co., Houston, for the section of the line from Waskom to Magnolia; and to Omaha Dredge & Dock Co. for the Red river and Ouachita river crossings. Completion of the line is expected to attract industrial as well as residential expansion in the areas to be served.



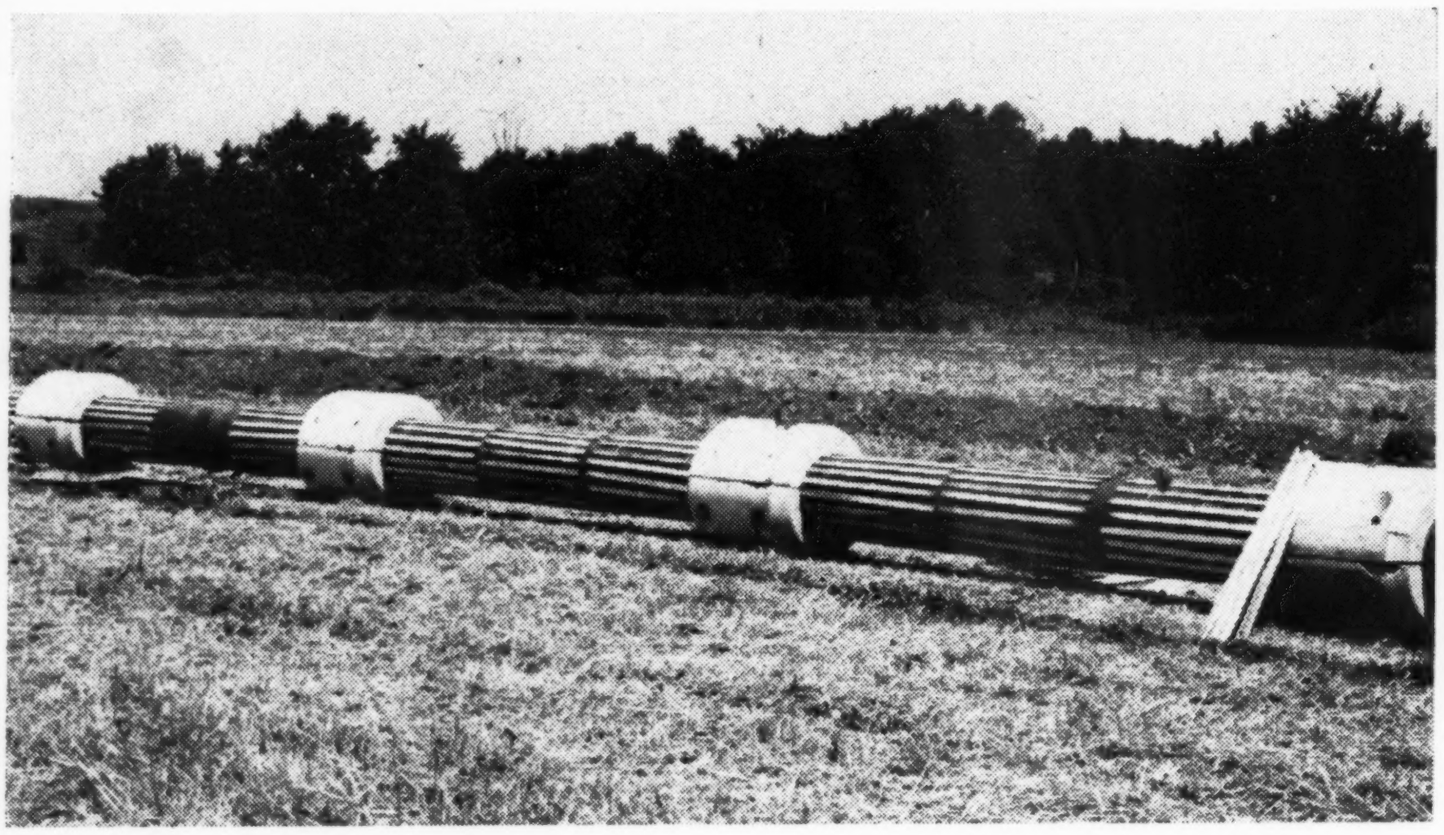
**The last of three long sections of pipe is pulled across the Ohio river by construction crews working on Texas Gas Transmission Corp.'s Texas-to-Ohio natural gas pipeline. The pipe has been bent to conform to the contour of the river bank.**

## WESTERN SUPPLY CO. GROWS

Western Supply Co. (Tulsa), recently elected a member of the Tubular Exchanger Manufacturers, has announced expansions in its heat exchanger division in sales and engineering.

Western Supply will open a branch office in Houston, with Frank M. Gibbons as heat exchanger representative for the Gulf coast area. Paul R. King will continue to represent Western Supply's line of pipe, valves, and fittings in Houston.

Company officials also announced that E. D. Anderson has been appointed chief engineer in the heat exchange division. He will be assisted by two new graduate engineers: Charles D. Axelrod and Edward W. Flaxbart.



**Twenty newly developed ton-size concrete river weights are being used to sink underwater portions of a 38-mile, 20-in. steel gas pipeline in rural Ohio. The weights are being used by Ohio Fuel Gas Co. and Mahoney Contracting Co. to anchor the pipe on waterway beds encountered in Fairfield and Franklin counties.**

# AN *energizable* LUBRICANT

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*Fully automatic lubrication* for Nordstrom valves is here! Introduction of Rockwell *Hypermatic* lubricant marks the greatest advancement in the valve industry since the invention of Nordstrom valves 30 years ago. Hypermatic is the first and only genuine automatic lubricant.

Now you can make deep cuts in your valve maintenance cost because your lubrication crew need devote only 1/10, 1/20, 1/50, up to 1/100 as much time to re-lubrication.

Your Nordstrom valves will give better service with less cost because each one will be automatically maintained in a condition of 100% lubrication, even in event of considerable neglect.

Leakage will be prevented because Hypermatic both seals and lubricates with split-second action and positive certainty.

Unlike any other lubricant, Hypermatic is compressible and expansible. Self-powered energy is created within the lubricant merely by turning the lubricant screw or using a grease gun. This energy then serves as a powerful force-feed. Almost twice as much Hypermatic can be compressed into the valve's lubricant chambers. The pressure is retained, not for days, but for months, if the valve is not operated. If frequently operated, Hypermatic will retain its pressure for scores of turns longer than if non-automatic lubricant is used.

### NOTHING TO BUY EXCEPT THE LUBRICANT

Instead of resorting to the use of extraneous devices or endeavoring to use variable line pressure, Hypermatic provides a new system of lubrication which gives the effect of a vastly improved valve design. You don't have to invest a single cent in mechanical devices. You don't even have to purge the old lubricant. Simply switch to Hypermatic and apply it to your present Nordstrom valves. It will displace the old lubricant.

Your Nordstrom valves will use less Hypermatic than non-automatic lubricant because Hypermatic creates, by its flexible nature, a "spring-action" which to a great extent prevents over-lubrication and under-lubrication.

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One pipeline spread of Latex Construction Company laid and took-up 418 miles of pipe during our fiscal year ending Nov. 30, 1948 . . . demonstrating the value of combining years of experience and specialization with a well integrated organization for more efficient pipeline construction.

The mileage of pipeline work done by this one spread was divided as follows:

Miles of Pipe laid, 16" and larger . . . . 306
Miles of Pipe laid, 8", 10" and 12" . . . 62
Miles of Pipe taken-up and reconditioned . . 50

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## FPC LUMPS HEARINGS ON FIVE PENNSYLVANIA PETITIONS

Proceedings involving five pipeline construction applications were consolidated in an FPC action early last month. The applications involved transportation and sale of natural gas by The Manufacturers Light & Heat Co., Pittsburgh, to distribution companies serving the Harrisburg, Allentown, Bethlehem, Reading and Lancaster, Pa., areas.

Commission hearings on the action commenced Sept. 28.

Manufacturers is proposing to construct and install connections with the pipe systems of Allentown-Bethlehem Gas Co., the Harrisburg Gas Co., Consumers Gas Co., and Lancaster County Gas Co. Each of the four distribution companies has filed an application in connection with construction of facilities necessary to receive gas from Manufacturers, and has asked FPC (1) to find that the companies are not subject to FPC jurisdiction or, as an alternative, (2) to authorize construction of the proposed facilities.

## LOOPS FOR SOUTHERN NATURAL

Southern Natural Gas Co., Birmingham, received a Federal Power Commission okay last month on its application to build natural gas transmission facilities to increase the capacity of two of its branch lines in Alabama and Tennessee and to supply service to a cement company in Alabama. Cost of the project is $1.2 million.

Included in the construction will be 38.1 miles of branch loop lines, crossings of the Warrior and Chattahoochee rivers, and a 7.4-mile extension of a branch line to provide service to the Southern Cement Co. in Shelby county, Ala.

# *Pipeline People*

FRANK E. McNULTY, former manager of Koppers Co.'s Tulsa office, has joined the Protective Coatings Division of Pittsburgh Coke & Chemical Co. as manager of that firm's new Tulsa office to serve the Central Midwest. Russell H. Coe, national sales manager of the division, announced appointment of BENJAMIN H. MEANS as service manager of protective coatings for the entire U. S. Mr. Means has handled Pittsburgh Coating sales and service in the Houston area for more than a year.

CLIFTON W. WOLTZ, sales engineer for Cooper-Bessemer Corp., Mount Vernon, Ohio, has been transferred from the company's headquarters to the Dallas branch office. Mr. Woltz will continue in the capacity of sales engineer in the Texas area for all types of gas, diesel engine and compressor installations.

ERNEST O. THOMPSON, Texas railroad commissioner, was honored recently at a stag barbecue sponsored by a group of Amarillo citizens and attended by Mr. Thompson's friends from all over the Southwest. R. B. Anderson, president of Texas Mid-Continent Oil & Gas Assn., authored a tribute to Mr. Thompson which reviewed his career and his many contributions to the nation and the state of Texas. Mr. Thompson, former mayor of Amarillo, was first named to the Texas Railroad Commission in 1932. He was also a pioneer in the formation of the Interstate Oil Compact Commission.

EDWARD S. STEIGNER has been appointed tubular products development engineer for The Youngstown (Ohio) Sheet & Tube Co. Mr. Steigner, a member of the firm's metallurgical department for 15 years, will be associated with Karl L. Fetters, special metallurgical engineer.

W. E. PICKENS has joined the pipeline department of Dearborn Chemical Co., Chicago, as a service engineer. Mr. Pickens has served in a supervisory capacity for Sinclair Oil Co., Williams Brothers Corp., Oklahoma Contracting Co., El Paso Natural Gas Co. and G. G. Griffis Construction Co., specializing in the application of rust preventives to pipelines.

FRANK M. GIBBONS has been named division representative for the Gulf Coast area, according to J. E. Hughes, manager of the heat exchanger division, Western Supply Co., Tulsa. Mr. Gibbons will headquarter in the recently opened Houston branch office. He was formerly associated with the Bechtel Corp. E. D. ANDERSON, who joined Western Supply in 1947, has been appointed chief engineer for the exchanger division. He will supervise the work of two new engineers—CHARLES D. AXELROD and EDWARD W. FLAXBART.

**C. W. Woltz**
*. . . Cooper*

**E. O. Thompson**
*. . . Texan*

**F. M. Gibbons**
*. . . Western Supply*

**E. D. Anderson**

# Pipeline Progress Reports

PHILADELPHIA ELECTRIC CO., which has two projects under way, anticipates completion of one Nov. 1 and the other by Dec. 1. The first project, as previously reported, consists of 18 miles of cast iron pipe being laid from Rydal, Pa., to Penndel and Eddington, Pa., at a cost of $1.1 million. Tri-County Constructors was reported 53% complete on the first 4.7-mile spread; Counties Contracting & Constrution Co. was 40% complete on 5.2 miles, the second spread; Bucks County Construction Co. was 45% complete on the third spread —4.3 miles; and Henkels & McCoy was 65% complete on a 3.8-mile spread as of Sept. 1. On the steel main from Chester, Pa., to the Delaware-Pennsylvania state line, Chester Materials Co. had completed 20%.

HUGOTON PRODUCTION CO. started laying a 22-in. river crossing on the Cimarron near Hugoton, Kan., Aug. 28, and it was completed Sept. 10 by Trojan Construction Co., Oklahoma City. Swede Tillotson was foreman.

MOUNTAIN FUEL SUPPLY CO., Salt Lake City, had expected to complete by Sept. 15 32 miles of 20-in. pipe from Coalville, Utah, to Salt Lake City. Enoch Smith Sons Co. contracted the job.

KANSAS-COLORADO UTILITIES INC., Lamar, Colo., expected to complete by Sept. 20 21 miles of 4-in. and 6-in. lateral and 9 miles of gathering lines between Kendall and Syracuse, Kan. S. C. Patterson, Phillipsburg, Kan., was contractor.

EAST TENNESSEE NATURAL GAS CO. expects to complete by Dec. 2 the 172-mile, 22-in. line from Greenbrier, Tenn., to the Atomic Energy Commission at Oak Ridge. The first spread, working from Greenbrier east, made 19 miles in August. The second spread is now working from Wartburg west and the third spread was expected to start soon, working from Wartburg east. Contractors are Oman Construction Co. and R. H. Fulton Co., with engineering and supervision by Ebasco Services Inc. Construction superintendent is W. H. Hitchcock.

PEOPLES NATURAL GAS CO., Pittsburgh, expected to complete by Aug. 1 the 38 miles of 14-in. pipe Williams-Austin Co. has been building from Rockwood, Pa., to Vinco, Pa. The line is a tie-in with the Big Inch.

STANOLIND OIL & GAS CO. has under way 63 miles of 2⅝- through 26-in. gathering lines around its plant at Fullerton field, Texas. Deaton & Sons Inc., Odessa, Texas, reports work about 80% completed last month. C. L. Rogers Construction Co., Wichita Falls, also reports completion of 9 miles of 4- and 6-in. pipe for Stanolind.

CARTHAGE HYDROCOL INC. and TEXAS PIPE LINE CO. expected to complete 12- to 16-in. high pressure natural gas lines late last month. H. B. Zachry Co. was contractor with W. R. Bradford, superintendent.

NORTHWESTERN UTILITIES LTD., Edmonton, completed 2 miles of 12¾-in. pipe near Edmonton to serve the Imperial Oil Refinery on Sept. 7. The company is also under way on 17.7 miles of 16-in. pipe from Uncas, Alberta, to Edmonton. Two spreads are at work—one about 6 miles east of Edmonton and the other about 3 miles east. Last month the company reported approximately 14 miles completed on this latter line with final completion date unknown.

ALABAMA-TENNESSEE NATURAL GAS CO., which is building a 155-mile line from Selmer, Tenn., to Huntsville, Ala., to connect with Tennessee Gas Transmission's 24-in. line, reported only 8 miles in 30 days up to the middle of September because of lack of pipe. This stretch was made on the 80 miles of 10¾-in. pipe which begins near Selmer and ends at Muscle Shoals, Ala. Lehman-Hoge & Scott is the contractor. The line to Muscle Shoals is expected to be completed in November and portions to Decatur and Huntsville by January or February.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, is making progress on its Big Inch looping project. On the section running 177 miles from Lebanon, Ohio, to Woodsfield, Ohio, on spread No. 6, running as far as Roseville, 17 miles was covered, and on spread No. 7, from Roseville to Woodsfield, 15 miles was reported completed. Associated Pipeline Contractors is laying spread No. 6 while Williams Bros. has spread No. 7. Both are expected to be completed in November. Work on another 37 miles of 20-in. line in north Louisiana near Arcadia is expected to start this month. Arrival of pipe was anticipated by late September. Associated has the job under General Superintendent J. A. Williamson.

OHIO FUEL GAS CO., Columbus, has H. L. Gentry Construction Co. at work on 11 miles of 16-in. line from Pavonia compressor station in Ohio to Weaver compressor station at Richland. Work started Sept. 6.

SKELLY OIL CO. started work July 4 on a gathering system in Carthage field with Hubbard Contracting Co. doing the work.

TENNESSEE GAS TRANSMISSION CO., Houston, made good progress on its big main line looping project in the 30 days through Sept. 4. H. C. Price completed its spread from near Ruleville, Miss., to the Mississippi river with a 27-mile stretch accomplished during the period. Morrison Construction Co. added 17 miles to complete a spread from Spring, Texas, to the Trinity river. Tennessee Gas completed a spread


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from the Arkansas-Louisiana state line to near Monroe, La., and laid 4 miles of a spread from Holly Springs, Miss., to the Mississippi-Tennessee state line, which it expects to complete in October. Hubbard Contracting Co. expects to finish this month a gathering system for Village Mill field for Tennessee Gas.

MICHIGAN CONSOLIDATED GAS CO., Detroit, expected completion sometime after the middle of September of a 15-mile strip of 20-in. line from Austin field to Goodwell field, Mich., and planned to start construction of 22 miles of 12-in. line from Milford, Mich., to Ann Arbor. Somerville Construction Co., Ada, Mich., contracted for both jobs with C. G. Daniel as superintendent.

TRENTON ROCK OIL & GAS CORP. anticipates completion by Oct. 15 of a short gathering line on the Ohio-Indiana line.

MICHIGAN-WISCONSIN PIPE LINE CO., Detroit, which has J. R. Horrigan Construction Co. Inc. working on four spreads on its main line, reports as follows:
Spread No. 1: 156½ miles from Maryville, Mo., to Fairfield, Iowa; 138 miles of pipe lowered in. Spread No. 2: 182½ miles from Fairfield to Millbrook, Ill.; 110 miles of pipe lowered in. Spread No. 3: 180 miles from Austin field, Mich., to Lake county, Ind.; 148 miles of pipe lowered in. Spread No. 4: Millbrook to Lake county, Ind.; 105 miles of pipe lowered in. Completion is set for May 1950.

TEXAS GAS TRANSMISSION CO. made good headway during August on its Texas to Ohio main line, completing 128 miles of 26-in. line for a total of 420 miles or 60% of the grand total. Expected to be under way by late September were three construction crews working on a 140-mile section from Carthage field, Texas, to Lisbon, La. The delays in pipe shipments necessitated some shutdowns on spreads. All four lines under the Ohio river have been completed and crossings of the Tennessee, Cumberland, Green and Mississippi rivers were progressing on schedule. Work was expected to start on the Red river, La., crossing by Sept. 15. Latex Construction Co. was awarded the contract for the latter job. Latex also reported approximately 70 miles completed out of 101 miles of 26-in. line from Sharon, La., northeast to the Mississippi river south of Lake Village, Ark. Completion of the entire project is still set for January 1950.

INTERSTATE NATURAL GAS CO. has Latex Construction Co. at work on 29 miles of line west of Baton Rouge, La. At the end of August the job was reported 35% complete.

TEXAS PIPE LINE CO. has completed 75% of the job of constructing four pipeline pump stations at Lindsay, Okla., and Haskell, Colorado City and Odessa, Texas. Latex Construction Co., Houston, is doing the work.

ARKANSAS-LOUISIANA GAS CO. has started preliminary work with two spreads under Latex Construction Co. on its 91-mile, 20-in. gas line from Magnolia, Ark., to Malvern. Shipments of pipe were expected to start in September. E. C. Norris is general superintendent.

CITIES SERVICE GAS CO., Oklahoma City, expected to complete last month its 130-mile, 26-in. line from Newton to Ottawa, Kan. R. H. Fulton is doing the work. The project is part of the $17.8 million Hugoton to Kansas City main line.

PANHANDLE EASTERN PIPE LINE CO., which is looping 356 miles of its main transmission line, reports 84½ miles of 24- and 26-in. loops near Liberal, Kan., about complete. R. H. Fulton is the contractor.

NORTHERN NATURAL GAS CO., Omaha, has started work on the river crossing near Oakland, Iowa, and was expecting to start late in September the laying of 62 miles of 20- and 24-in. line near Garden City, Kan. R. H. Fulton Co. has the contract.

COLORADO INTERSTATE GAS CO. was expecting to start construction on 15.7 miles of 20-in. line near Lakin, Kan., with R. H. Fulton Co. as contractor. Crossing the Arkansas river in Kansas was also to be started last month.

MAGNOLIA PIPE LINE CO. completed 13 miles of 8-in. line late in August with C. L. Rogers Construction Co. doing the work.

PHILLIPS PETROLEUM CO. was to start late in September on 25 miles of gas gathering system near Edmond, Okla. Vaughn & Taylor Construction Co., Wichita Falls, Texas, has the contract.

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